Environmental Impact Analysis Process

Environmental Assessment
for
Defense Satellite Communications System III
with Integrated Apogee Boost System

Cape Canaveral Air Station, Florida

July 1995

DEPARTMENT OF THE AIR FORCE
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FINDING OF NO SIGNIFICANT IMPACT

DEFENSE SATELLITE COMMUNICATIONS SYSTEM III WITH INTEGRATED APOGEE BOOST SYSTEM CAPE CANAVERAL AIR STATION, FLORIDA

Pursuant to the National Environmental Policy Act, the Council on Environmental Quality regulations implementing the Act (40 CFR 1500-1508), Department of Defense (DOD) Directive 6050.1, DOD Instruction 5000.2, and Air Force Instruction 32-7061, which implements these regulations in the Environmental Impact Analysis Process (EIAP), Air Force Regulation 19-9 regarding interagency coordination, and other applicable federal and local regulations, the United States Air Force has conducted an assessment of the potential environmental consequences of the processing for launch of six Defense Satellite Communications System III (DSCS III) satellites with Integrated Apogee Boost System (IABS). The no action alternative was also considered. This Finding of No Significant Impact (FONSI) summarizes the results of the evaluation.

Proposed Action and Alternatives: The Air Force proposes to process six DSCS III/IABS satellites for launch at Cape Canaveral Air Station (AS), Florida, during the time frame from 1995 through 2003. The satellites will be operated on-orbit for approximately 10 years until their end of life. The no-action alternative would be continued reliance on the existing on-orbit DSCS satellites with no replenishment until the operational life of the existing satellites is ended.

Anticipated Environmental Effects: The environmental assessment evaluated the environmental impacts of the satellite system with regard to transportation, processing, operation, and disposal. Impacts associated with the launch vehicle have been previously assessed in an environmental assessment dated February 1989 for the Medium Launch Vehicle II program that resulted in a FONSI. The potential environmental effects of the proposed action and alternatives were assessed for the following environmental resource areas: air quality (including stratospheric ozone), hazardous materials, hazardous waste, solid waste, pollution prevention, nonionizing radiation, ionizing radiation, water quality, biological communities, cultural resources, noise, socioeconomics, orbital debris, and safety.

Operations will be conducted in accordance with all applicable federal, state, and local legislation and regulation, including existing permits. Operational effects would cause quantifiable increases from the existing baseline conditions of no more than one percent for any of the resource areas considered with the exception of orbital debris. The proposed action would increase the population of tracked objects in near geosynchronous Earth orbit by approximately 2.6 percent. At the end of the operational life of each satellite, the remaining fuel would be used to move the satellite to an orbit beyond geosynchronous Earth orbit.

Conclusion: Based on the environmental assessment, it is concluded that the proposed action will not result in significant environmental impacts or cause significant cumulative impacts in association with other programs. An environmental impact statement is not required.

Mitigation: No significant impacts were identified which would require mitigation.

Point of Contact: A copy of the "Defense Satellite Communications System III with Integrated Apogee Boost System Finding of No Significant Impact and Environmental Assessment," July 1995, may be obtained from, or comments on these documents may be submitted to:

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Defense Satellite Communications System III
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Cape Canaveral Air Station, Florida

Prepared for

Department of the Air Force
Headquarters Space and Missile
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and
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ACRONYMS AND ABBREVIATIONS

45 SW	45th Space Wing
45 CES/CEV	45 SW environmental planning function
°F	Degrees Fahrenheit
AB	Administration Building
AFB	Air Force Base
AFI	Air Force Instruction
AFOSH	Air Force Occupational Safety and Health
AFSCN	Air Force Satellite Communication Network
AS	Air Station
AFSPC	Air Force Space Command
Al_2O_3	Aluminum Oxide
AQCR	Air Quality Control Region
AST	Aboveground storage tank
BE	Brilliant Eyes
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFC	Chlorofluorocarbon
CFR	Code of Federal Regulations
cm	centimeter
CMP	Coastal Management Program
CO	Carbon monoxide
CWA	Clean Water Act
CY	Calendar year
CZMA	Coastal Zone Management Act
DOD	Department of Defense
DOT	Department of Transportation
DPF	Defense Satellite Communications System Processing Facility
DRMO	Defense Reutilization and Marketing Office
DSCS	Defense Satellite Communications System
DSF	Defense Satellite Communications System Storage Facility
EC	Earth coverage
EA	Environmental assessment
EIAP	Environmental impact analysis process
EMTF	Electromechanical Test Facility
EO	Executive Order
EOL	End of life
EPA	Environmental Protection Agency
EPA-17	Environmental Protection Agency 17 Priority Pollutants
EPCRA	Emergency Planning and Community Right-to-Know Act
EVCF	Eastern Vehicle Checkout Facility
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FGFWFC	Florida Game and Fresh Water Fish Commission
FIP	Federal Implementation Plan

FONSI	Finding Of No Significant Impact
FPL	Florida Power and Light
FR	Federal Register
FSA-1	Fuel Storage Area 1
FSA-2	Fuel Storage Area 2
FWPCA	Federal Water Pollution Control Act
GEO	Geosynchronous Earth Orbit
GHz	Gigahertz
gpd	gallons per day
GPS	Global Positioning System
GPTU	Generic Propellant Transfer Unit
HBFC	Hydrobromofluorocarbon
HCFC	Hydrochlorofluorocarbon
HCl	Hydrochloric acid
IABS	Integrated Apogee Boost System
IPA	Isopropyl alcohol
JPC	Joint Propellants Contractor
km	kilometer
km^2	square kilometer
lb/ft^2	pounds per square feet
LBSC	Launch Base Support Contractor
LEO	Low Earth Orbit
LV	Launch vehicle
MBA	Multi-beam antenna
MEO	Medium Earth Orbit
mgd	million gallons per day
mg/m^3	milligrams per cubic meter
MHz	Megahertz
MIL-STD	Military Standard
MLV	Medium Launch Vehicle
MMH	Monomethyl hydrazine
MSDS	Material Safety Data Sheet
mW/cm^2	milliwatts per square centimeter
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
nm	nanometer
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NTL	No threat level
O_3	Ozone
ODC	Ozone depleting chemical
ODP	Ozone depleting potential
OFW	Outstanding Florida Water
OPlan	Operations Plan
OSHA	Occupational Safety and Health Administration
Pb	Lead
PCF	Propellant Conditioning Facility
PEL	Permissible exposure limit
PM-10	Particulate matter smaller than 10 micrometers
POL	Petroleum, oil, and lubricant
ppm	Parts per million

PPMAP	Pollution Prevention Management Action Plan
PPP	Pollution prevention program
PSCCE	Production Satellite Configuration Control Element
RF	Radio frequency
rpm	Revolutions per minute
SAB	Satellite Assembly Building
SARA	Superfund Amendments and Reauthorization Act
SAR	Specific absorption rate
SBIRS	Space Based Infrared System
SCAPE	Self-Contained Atmospheric Pressure Ensemble
SHF	Super High Frequency
SIP	State Implementation Plan
SLC	Space Launch Complex
SLEP	Service Life Extension Program
SO_2	Sulfur dioxide
SO_x	Sulfur oxides
SRMU	Solid Rocket Motor Upgrade
tpy	tons per year
TVCF	Transportable Vehicle Checkout Facility
US	United States
USAF	United States Air Force
USFWS	United States Fish and Wildlife Service
UV	Ultraviolet
UV-B	Ultraviolet B wavelength region
VOC	Volatile organic compounds
W/kg	Watts per kilogram
WQA	Water Quality Act

SECTION 1.0

PURPOSE OF AND NEED FOR THE ACTION

1.1 BACKGROUND

The Defense Satellite Communications System (DSCS) provides a high data rate satellite communication link for the Department of Defense (DOD) and other governmental agencies.

The first generation of DSCS satellites were launched between June 1966 and June 1968. into quasi-synchronous equatorial orbits with a daily latitudinal drift rate over the equator of 30˚. Twenty-six of these DSCS I satellites were launched. DSCS I satellites were simple spin-stabilized designs with no station-keeping capability (Zee, 1989).

The second generation, DSCS II, incorporated a station-keeping capability. Sixteen DSCS II satellites were launched between October 1971 and June 1983, with four not achieving orbit (SMC/MCD, 1995). The third generation, DSCS III, incorporates further improvements and is described later in this assessment. Twelve DSCS III satellites have been launched.

The MILSATCOM Joint Program Office (DSCS Program) of the Space and Missile Systems Center, Air Force Materiel Command, in cooperation with the Air Force Space Command, proposes to launch six DSCS III satellites into their specified orbits from Cape Canaveral Air Station (AS) launch facilities. These satellites would replenish the existing, on-orbit, constellation as the existing satellites reach the end of their operational life, to maintain the high data rate satellite communication capability required by the DOD. The proposed action needs an environmental assessment (EA).

1.2 PURPOSE AND NEED

The continuing upheaval ın the wake of the disintegration of the Soviet Union into several nuclear capable and for the most part unstable political entities, and recent United States (US) military involvement in the Middle East and eastern Africa require that the United States have a command, control, and communications system capable of supporting US and allied forces anywhere in the world, should they need to be deployed. DSCS is currently the only high data rate satellite communications system that the DOD has for command, control, and communication with deployed forces, both within and outside of the continental US. This will remain so until the end of the decade and early into the next century when a Super High Frequency (SHF) follow-on system will replace DSCS. At that time the DSCS III constellation of satellites will either have reached their end of life (EOL) or those that remain operative will be used as redundant, on-orbit, backups for the SHF follow-on system which should just begin to become operational. The SHF follow-on system will begin to be launched around 2007 and continue through 2011 when the fully deployed SHF follow-on constellation will be on-orbit. Between now and sometime after the turn of the century, DSCS will be the only deployed system capable of meeting DOD's high data rate satellite communications mission support requirements.

The current fleet of DSCS satellites have been in operation for over 10 years and are nearing their EOL. At the time the DSCS satellites quit functioning, the high data rate satellite communication link will be lost and DOD

missions will be severely impacted if action is not taken. The purpose of this action is to continue the capability of a high data rate satellite communication link for the DOD and other governmental agencies.

1.3 PROGRAM DESCRIPTION

The third-generation DSCS III mission is to maintain nuclear hardened, limited antijam, secure-voice, and high data rate communications in the 3-30 gigahertz (GHz) range for the DOD and other government agencies. The DSCS program is a vital part of the comprehensive plan meeting military communication needs. Users of the system range from airborne terminals with 33-inch diameter antennas to fixed installations with 60-foot diameter antennas and elaborate data processing equipment. Mobile terminals supporting ground and naval operations communicate with each other and the command chain through the satellites. "Housekeeping" control is provided through the Air Force Satellite Communication Network (AFSCN), a worldwide network of transmit/receive ground antennas. Production Satellite Configuration Control Elements (PSCCE) at ground support locations provide command control.

Providing uninterrupted secure-voice and high data rate communications with antijam capability and sophisticated survivability enhancements, the DSCS III satellites support globally distributed Department of Defense users. These communications requirements must be maintained through the year 2007.

The operational constellation consists of five active satellites in geosynchronous, equatorial, orbital slots. To date, a total of eight DSCS III satellites have been launched. The first four were launched using the Space Shuttle and Titan 34D launch vehicles over five years ago. Within the last three years, an additional four satellites have been launched using Atlas II launch vehicles. Six more satellites have been manufactured and remain to be launched using the Atlas II.

The satellites are inserted into orbit using an Integrated Apogee Boost System (IABS) that separates from the satellite after the final geosynchronous orbit is achieved. The IABS is processed by the satellite contractor, and is not considered part of the launch vehicle.

1.4 PURPOSE OF THE ENVIRONMENTAL ASSESSMENT

The purpose of this EA is to make the decision maker(s) aware of the environmental consequences of the proposed action and alternatives, including the no-action alternative. The most impacted environmental resource areas associated with the transportation, prelaunch processing, operation, and ultimate disposal of six DSCS III/IABS satellites are identified and analyzed. Additionally, this EA identifies mitigative measures that should be implemented to ensure environmentally safe program functions.

1.5 ISSUES

Environmental resource areas considered are air quality (including stratospheric ozone depletion), hazardous materials, hazardous waste, solid waste, pollution prevention, nonionizing radiation, ionizing radiation, water quality, biological communities, cultural resources, noise, socioeconomics, utilities, orbital debris, and safety (including transportation). A conformity analysis or determination under the Clean Air Act is not required since the Cape Canaveral AS area is in attainment or unclassified for the national ambient air quality standards. Permits are referenced in Sections 4 and 5.

1.6 SCOPE OF THE ENVIRONMENTAL ASSESSMENT

This EA is part of the environmental impact analysis process (EIAP) for the proposed project. The EIAP is set forth in Air Force Instruction (AFI) 32-7061, which implements the National Environmental Policy Act (NEPA) and the President's Council on Environmental Quality (CEQ) regulations. Additional EIAP requirements are contained in DOD Directive 6050.1 and DOD Instruction 5000.2. This EA identifies, describes, and evaluates the potential environmental impacts of activities associated with the proposed action, and other reasonable alternatives, including the no-action alternative.

It also identifies all required environmental permits. As appropriate, the affected environment and environmental consequences of the action and alternatives may be described in terms of a regional overview (i.e., Brevard County and the City of Cocoa Beach) or a site-specific description (Space Launch Complex 36A). Finally, the EA identifies mitigation measures to prevent or minimize any significant environmental effects.

Applicable program and environmental data were collected to analyze and document the environmental consequences of the proposed action and alternatives. Under NEPA, the Air Force is charged with determining the effects of the proposed action and alternatives on the environment. If the Air Force approves the EA determination that the environmental impacts will not be significant, they will prepare a finding of no significant impact (FONSI).

For the proposed action, this EA assesses environmental impacts related to the transportation, prelaunch processing, operations, and ultimate disposal of six DSCS III/IABS satellites. The IABS will not be part of the on-orbit DSCS III satellite since it is used only to insert the satellite into near-geosynchronous orbit. However, it is processed with the satellite by the satellite contractor, and will be included in the EA. Ground control and user facilities or equipment are not included aside from those situated at Cape Canaveral AS that are used in prelaunch processing operations. The six Atlas II launch vehicles that will be used to launch the satellites have been previously assessed (USAF, 1989b), and a FONSI was signed. The issues analyzed are identified in Section 1.5.

1.7 ORGANIZATION OF THE ENVIRONMENTAL ASSESSMENT

This EA comprises eight major sections. Section 1 contains an introduction, a description of the purpose and need for the proposed action and the scope of this EA. Section 2 describes the proposed action, alternatives to the proposed action, and summarizes the environmental impacts of the alternatives. Section 3 presents information on the affected environment, providing a basis for analyzing the impacts of the proposed action and alternatives. Section 4 is an analysis of the environmental consequences of the proposed action and alternatives. Section 5 addresses regulatory requirements and lists the relevant laws that pertain to the proposed action. Section 6 lists persons and agencies consulted in the preparation of this EA. Section 7 is a list of source documents relevant to the preparation of the EA. Section 8 lists preparers of this document. An appendix provides additional information relevant to the EA.

SECTION 2.0

DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

The United States Air Force (USAF) proposes to process six DSCS III/IABS satellites for launch at Cape Canaveral AS, Florida, through 2003. The satellites will be operated on-orbit for approximately 10 years until their end of life.

2.2 PROJECT DESCRIPTION AND LOCATION

2.2.1 Location and Background

Cape Canaveral AS is located on Cape Canaveral in Brevard County, on Florida's Atlantic coastline near the City of Cocoa Beach. Figure 1 shows the general location of Cape Canaveral AS, which is located on the northern portion of a barrier island. The island is bounded by the Atlantic Ocean to the east and the Banana River to the west.

In 1947, Cape Canaveral AS was selected as the location for a US missile testing range, with construction beginning in 1950. The first missile was launched from Cape Canaveral AS on July 24, 1950. Continuous advancement in technology made possible the launching of the National Aeronautics and Space Administration (NASA) Saturn 1B in 1961, the Air Force Titan II in 1974, and the Navy Trident missile, which began testing in 1977. Cape Canaveral AS has 81 miles of paved roads which connect various launch and support facilities with the centralized industrial area. Development of Cape Canaveral AS as a missile test center has produced an installation that is unique with respect to other Air Force installations (USAF, 1991a).

Cape Canaveral AS occupies a total of 15,804 acres of land (USAF, 1991a). Facilities at Cape Canaveral AS are scattered, with scrub vegetation separating these developed areas. Elevations range from sea level to 15 to 20 feet above mean sea level.

2.2.2 Satellite

The DSCS III/IABS satellite will weigh approximately 5,910 pounds at launch, including the IABS, adapters, ballast, and all propellant. Figure 2 shows a DSCS III satellite in its orbital configuration. The satellite itself weighs 2,598 pounds and consists of seven subsystems (MMAS, 1994a; MMAS, 1994b):

- Structure and Mechanisms
- Attitude Control
- Thermal Control
- Propulsion
- Electrical Power and Distribution
- Telemetry, Tracking, and Command
- Communication

The structure and mechanisms subsystem includes the satellite structure; mechanisms that join the satellite to the IABS and rotate the solar array panels and the gimbaled dish antenna; and ordnance that provides for separation from the IABS and deployment of the solar array panels and gimbaled dish antenna.

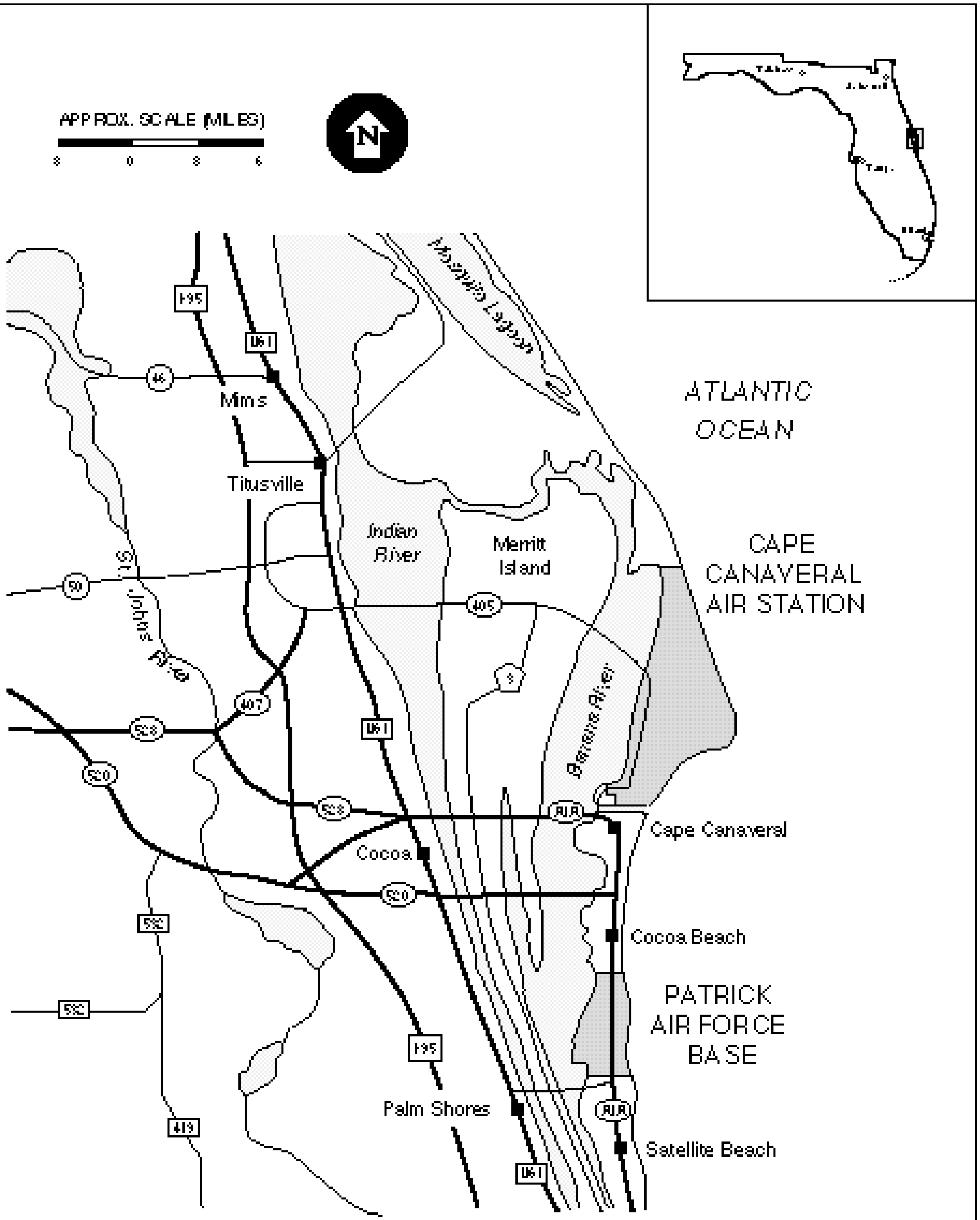

FIGURE 1
GENERAL LOCATION MAP
CAPE CANAVERAL AIR STATION

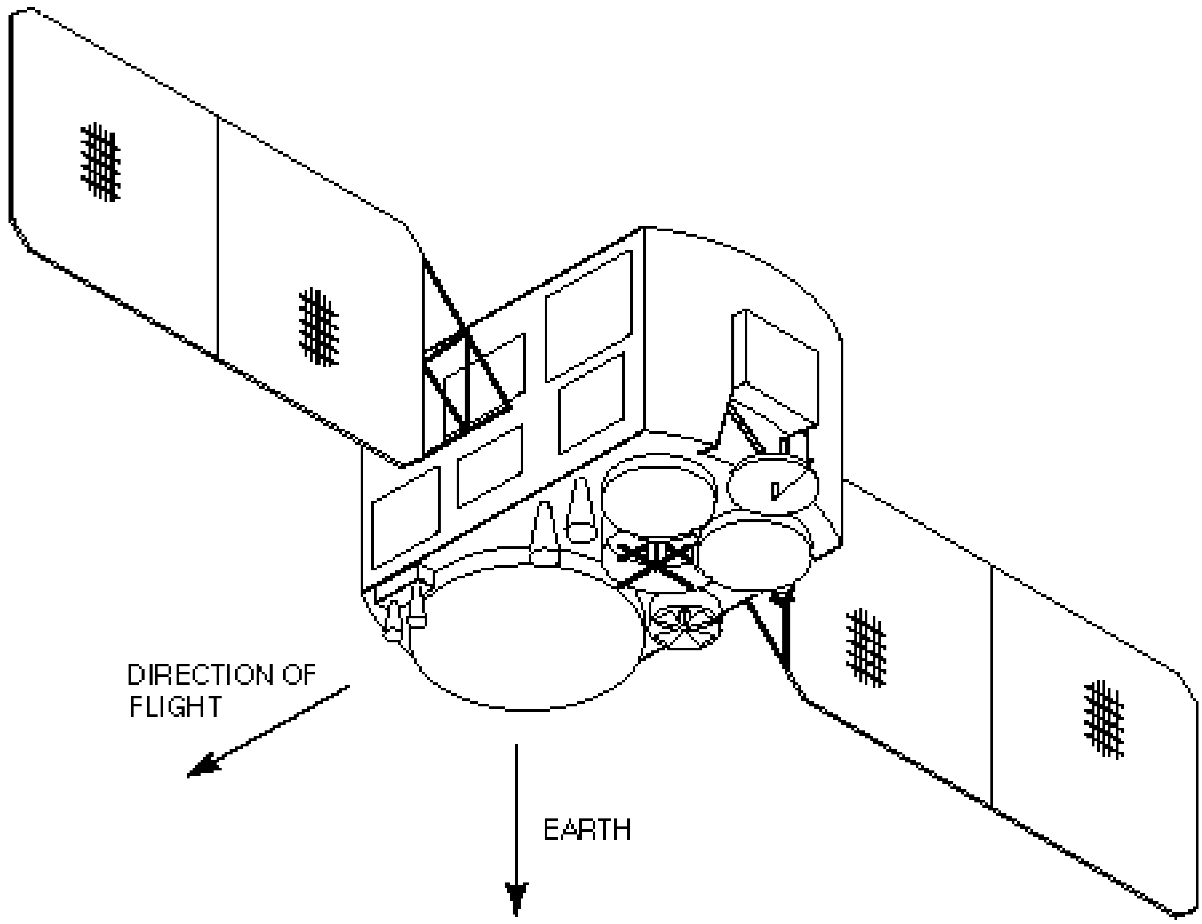

FIGURE 2
DSCS III SATELLITE ON-ORBIT

The structure consists primarily of aluminum honeycomb panels joined with magnesium and aluminum edge members. Two equipment panels are manufactured from thoriated magnesium (ionizing radiation source).

The attitude control subsystem consists of four mechanical reaction wheel assemblies and sensors that detect the position of the earth and sun. This subsystem monitors and controls the orientation of the satellite, including reorientation through the propulsion subsystem.

The thermal control subsystem maintains equipment temperatures through thermal blankets, coatings, heaters, and thermostats. The thermal blankets consist of aluminized Kapton, indium tin oxide, aluminized mylar, and polyester mesh.

The propulsion subsystem consists of four 22-inch spherical titanium tanks containing 152 pounds (24 gallons) of monopropellant hydrazine each and 16 one-pound catalytic thrusters. The tanks are pressurized with helium.

The electrical power and distribution subsystem includes the solar arrays with a total area of 126 square feet, three nickel cadmium batteries, and the cables and harness to conduct power and communications.

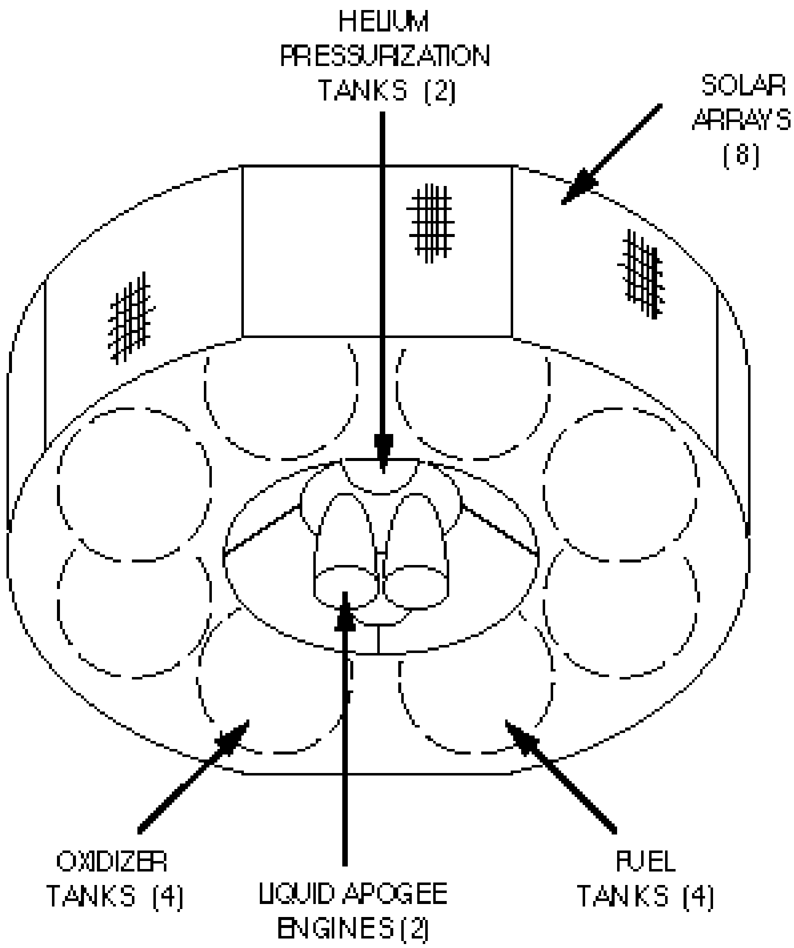

FIGURE 3
INTEGRATED APOGEE BOOST SYSTEM

The telemetry, tracking, and command subsystem provides command, control, and monitoring of all satellite functions.

The communication subsystem includes the antennas and electronic devices that communicate with Earth stations. Receiving antennas include two Earth coverage horns and a 61-beam wave guide lens with associated beam forming network. Transmitting antennas include two Earth coverage horns, two 19-beam wave guide lens assemblies with associated beam forming networks, a high-gain parabolic gimbaled dish, a UHF crossed dipole, and an S-band crossed dipole.

A Service Life Extension Program (SLEP) may be implemented for some of the DSCS III satellites. The changes associated with SLEP would be minor, including use of electrothermal hydrazine thrusters rather than catalytic thrusters and gallium arsenide based solar panels. These minor changes would not affect the impact analysis presented in this assessment.

2.2.3 Integrated Apogee Boost System

The IABS is used to move the satellite from geosynchronous transfer orbit to geosynchronous orbit. It is a bipropellant design using monomethyl hydrazine as fuel and nitrogen tetroxide as oxidizer. Figure 3 shows the

IABS, which consists of six subsystems (MMAS, 1994a; MMAS, 1994b):

- Structure
- Thermal Control
- Electrical Power and Distribution
- Ordnance
- Propulsion
- Telemetry, Tracking, and Command

The structure subsystem consists of a 60-inch diameter cylindrical shell enclosing a cruciform truss structure mounting two 110-pound thrust liquid apogee engines, and an adapter to attach the IABS to the Atlas II launch vehicle. The IABS structural material is predominantly aluminum.

The thermal control system maintains temperatures for critical components, including the propulsion system and solar arrays. It includes thermal blankets, heaters, coatings, and heat shields.

The electrical power and distribution subsystem consists of eight solar arrays around the periphery of the structure and a power transfer unit connected to the DSCS III satellite. The DSCS III electronics system controls the IABS.

The ordnance subsystem includes the electroexplosive devices and separation nuts that separate the DSCS III/IABS from the launch vehicle and the IABS from the DSCS III satellite. Separation is controlled by the launch vehicle and the DSCS III electronics systems.

The propulsion subsystem includes eight 25.5-inch diameter stainless steel or titanium tanks, four for the oxidizer and four for the fuel, two 18.2-inch helium pressure tanks, and two liquid apogee engines. The propulsion subsystem tanks hold approximately 1,010 pounds (139 gallons) of monomethyl hydrazine and 1,660 pounds (138 gallons) of nitrogen tetroxide.

The telemetry, tracking, and command subsystem consists of one S-band antenna which is controlled by the satellite electronics system.

2.2.4 Prelaunch Processing Facilities

The following existing facilities at Cape Canaveral AS will be used in support of DSCS III/IABS prelaunch processing operations: the Cape Canaveral AS runway (skid strip), DSCS Processing Facility (DPF), Fuel Storage Area 1 (FSA-1), Fuel Storage Area 2 (FSA-2), the Electromechanical Test Facility (EMTF), an Administration Building (AB), the Satellite Assembly Building (SAB), the Transportable Vehicle Checkout Facility (TVCF), the DSCS Storage Facility (DSF), the Propellant Conditioning Facility (PCF), and Space Launch Complex (SLC) 36A. Figure 4 shows the locations of the processing facilities at Cape Canaveral AS. Figure 5 shows the main spacecraft processing area where the DPF is located.

Skid Strip. The skid strip (Facility 50305) will be utilized by aircraft delivering manufactured satellites. It was constructed in 1952.

DSCS Processing Facility (DPF). The DPF (Facility 55820) will be the main processing facility for DSCS III and IABS prelaunch processing. Figure 6 is a plan view of this facility.

The DPF has four bays that are used to process satellites. All four bays are class 100,000 clean rooms. A class 100,000 clean room has filtering systems that maintain a particle count of less than 100,000 particles per cubic foot for particles of size 0.5 microns and larger. In addition, no more than 700 particles per cubic foot can be of size 5.0 microns and larger.

The DPF is segregated into two types of processing areas: hazardous and nonhazardous. The hazardous processing areas consist of the East and West Bays and Airlock. These three bays are class 100,000 clean rooms and are also rated as class I division II explosive safe areas in accordance with the National Electric Code.

The remaining areas are all rated as nonhazardous. The Main Bay provides a class 100,000 clean room for nonhazardous space

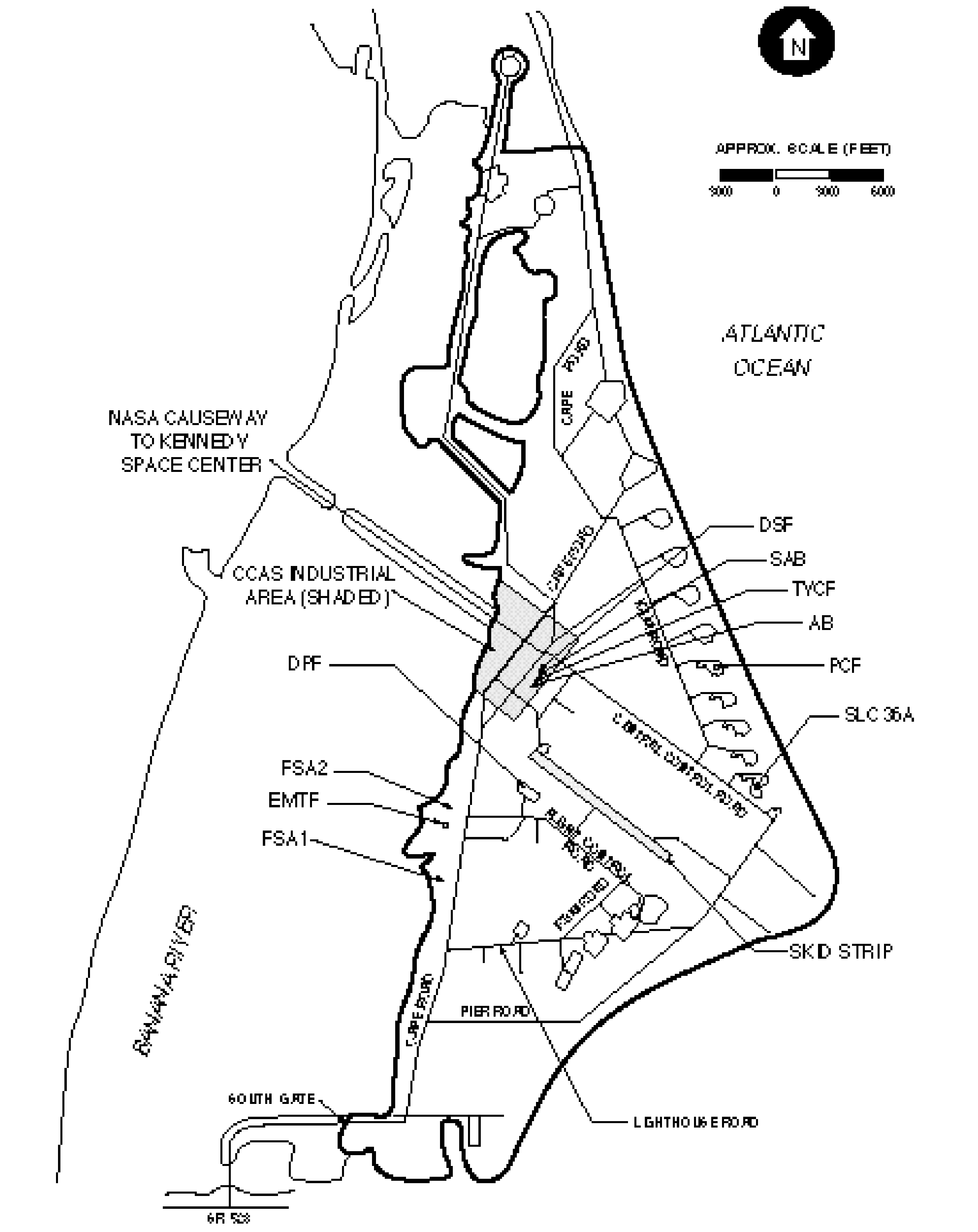

FIGURE 4
PROCESSING LOCATIONS AT CAPE CANAVERAL AIR STATION

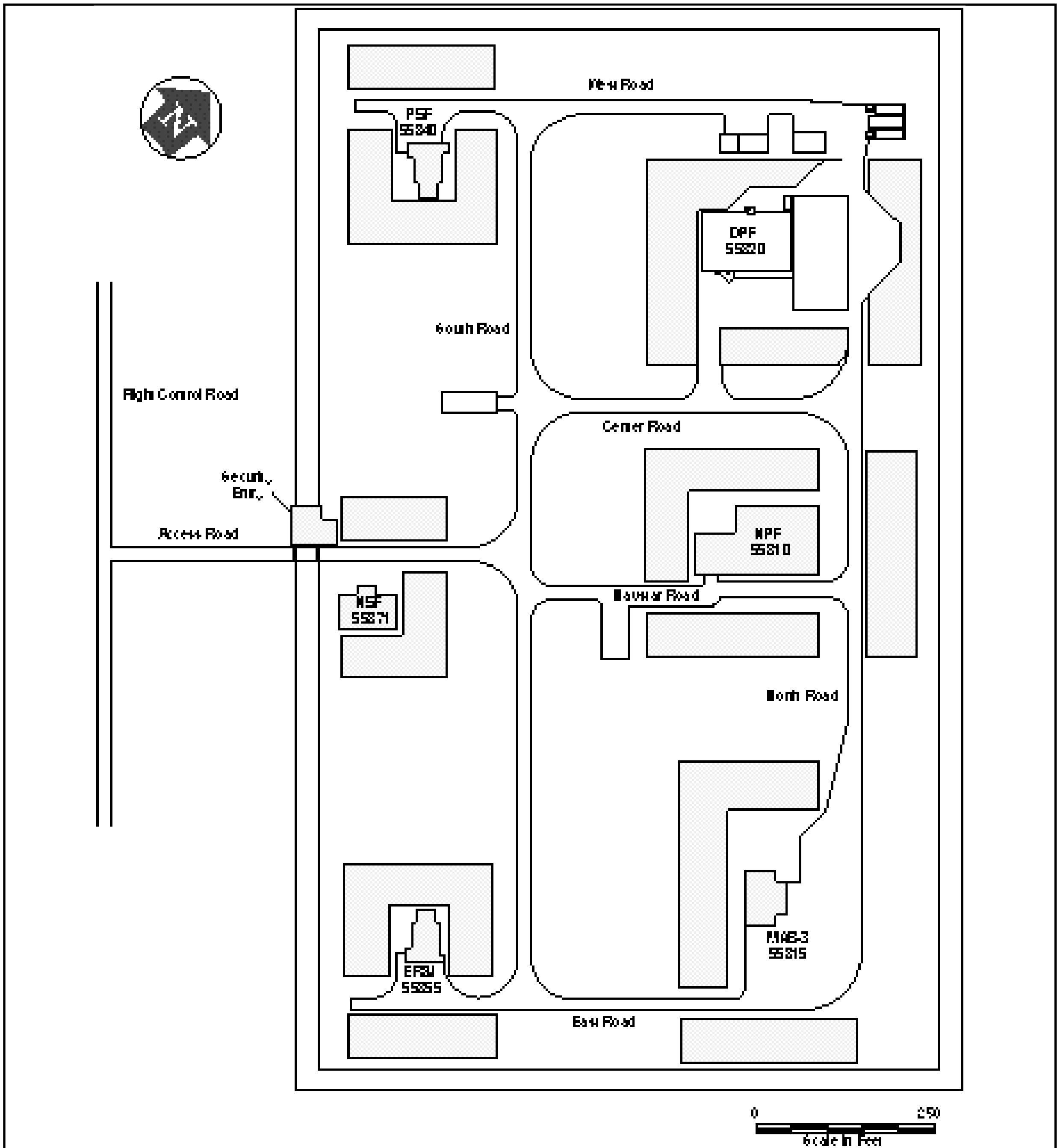

FIGURE 5 MAIN SPACECRAFT PROCESSING AREA

craft processing. The other nonhazardous areas are support areas such as the east and west control room and garment change rooms, the payload control centers A and B, the common room, security room, bonded storage, and break room.

An antenna on the roof of the DPF will be used for compatibility testing with ground control facilities at Onizuka Air Station, California, and Falcon Air Force Base, Colorado. Signals will be directed to an antenna on the SAB.

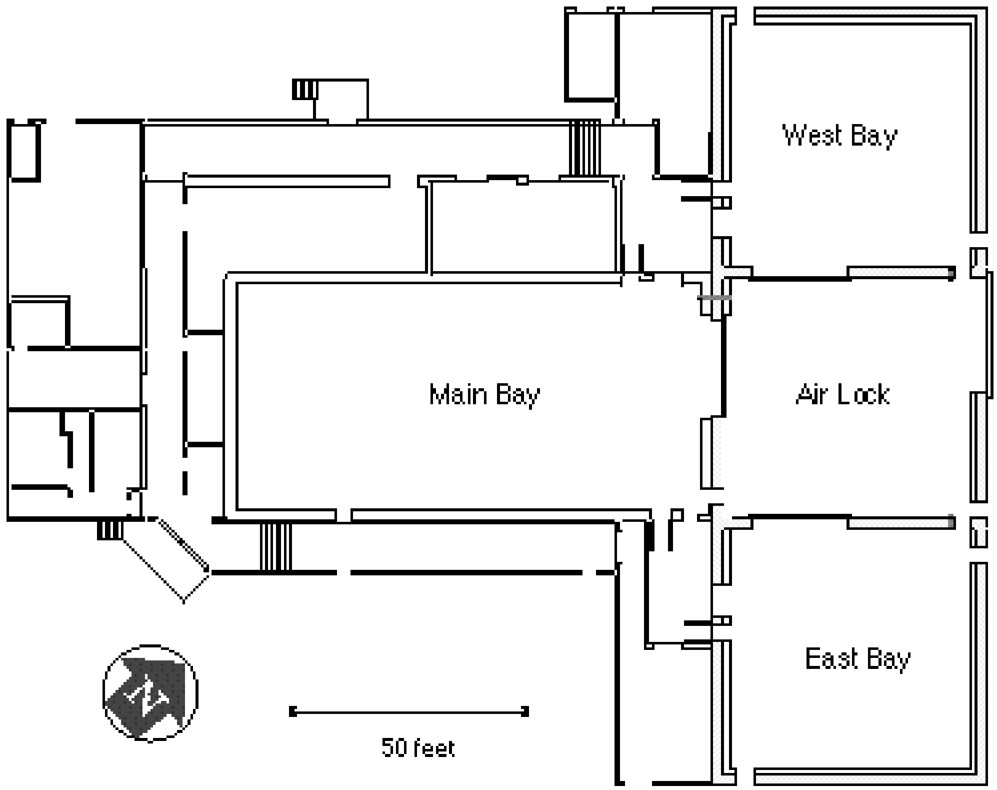

FIGURE 6 PLAN VIEW OF DSCS PROCESSING FACILITY

Fuel Storage Area 1 (FSA-1). FSA-1 will be used to store liquid propellants.

Fuel Storage Area 2 (FSA-2). FSA-2 will be used for ordnance storage.

Electromechanical Test Facility (EMTF). The EMTF (Facility 1058) will be used for testing of ordnance devices.

Administration Building (AB). The AB (Facility 49901) is a modular office complex providing office space for satellite contractor personnel.

Satellite Assembly Building (SAB). The Eastern Vehicle Checkout Facility (EVCF) is housed in the SAB (Facility 49904). An antenna on the roof will communicate with the satellite to test the communications system.

Transportable Vehicle Checkout Facility (TVCF). The TVCF is a mobile resource normally situated near the SAB, with a 23-foot diameter antenna. It is used in conjunction with the EVCF to test the satellite network links with ground control facilities.

DSCS Storage Facility (DSF). The DSF (Facility 44700) will be used to store shipping containers, the satellite transporter, propellant transfer equipment, and may be used for interim storage of the satellite and IABS.

Propellant Conditioning Facility (PCF). The PCF (Facility Number 8610) will be used to store propellant transfer equipment. It is located at SLC 14.

Space Launch Complex 36A (SLC-36A). Final testing and preparations will be performed here prior to launch.

2.2.5 Processing Operations

DSCS III satellites and the IABS will be transported together to the skid strip by Air Force C-141 aircraft. The satellite and IABS will be removed from the aircraft with a K-loader and transferred into an air-ride tractor-trailer for transport to the DPF. The DSCS III and IABS are typically delivered when needed for launch and not stored long-term at Cape Canaveral AS.

At the DPF, the satellite and IABS will be offloaded into the air lock, removed from the shipping containers, installed on individual test dollies, and transferred into the Main Bay for inspection and processing. After the receiving inspection and battery charging, a helium leak test of the DSCS III and IABS propulsion systems will be performed. After leak testing, the DSCS III and IABS are electrically connected and an integrated systems test is performed where all subsystems are functionally tested. Compatibility testing with the AFSCN is performed as part of this test, and antenna "hats" are used to reduce radio frequency emissions. Ordnance is tested at the EMTF.

The satellite and IABS will then be mated in the airlock. The DSCS III/IABS interface will be tested and ordnance installed in the Main Bay. The DSCS III/IABS will then be moved back to the airlock, the IABS helium tanks will be pressurized, and the assembly will be moved to the West Bay for propellant loading. The entire propellant transfer operation will be performed by certified handling and servicing personnel using Self-Contained Atmospheric Pressure Ensemble (SCAPE) suits.

In the West Bay, approximately 608 pounds of monopropellant hydrazine will be transferred into the four satellite fuel tanks. The fuel will be stored at FSA-1 under the supervision of the Joint Propellants Contractor (JPC) who will deliver fuel to the DPF when needed. Fuel will be transferred to the satellite from Department of Transportation (DOT) certified fuel storage containers.

Propellant transfer equipment and lines will be connected to the fuel storage container and the satellite fuel tanks will be evacuated, causing fuel to flow into the satellite fuel tanks. When the proper amount of fuel has been loaded, the transfer equipment and lines will be drained back into the fuel storage container, and purged and/or evacuated with gaseous nitrogen through the DPF hypergolic vent system which is connected to a vapor scrubber which will operate in accordance with its existing air permit. A liquid separator is included in the vent system to accumulate liquid.

The fuel transfer equipment will then be preliminarily decontaminated and moved to the PCF at SLC-14 for temporary storage. Wipes, gloves, and other solid waste will be placed in a 14-gallon container for the monopropellant hydrazine solid waste stream. This container will remain in the DPF until additional decontamination of the equipment is performed after the launch. The fuel storage container will be returned to FSA-1 by the JPC.

The four IABS fuel tanks will be loaded with 1,010 pounds of monomethyl hydrazine (MMH) from DOT certified fuel storage containers delivered by the JPC. Instead of evacuating the IABS fuel tanks, the fuel storage containers will be pressurized to induce flow into the IABS fuel tanks, with venting through the DPF vent system and vapor scrubber. Waste handling and preliminary decontamination is similar to the satellite fuel loading operation, with a 14-gallon container for the MMH solid waste stream, and the fuel transfer equipment moved to the PCF for temporary storage. The fuel storage containers will be returned to FSA-1 by the JPC. MMH-contaminated solids are acutely toxic hazardous wastes, and will be managed and labeled by the DSCS III/IABS in accordance with 45 SW Operations Plan (OPlan) 19-14. The waste container will remain at the generation site prior to removal by the JPC to a 90-day accumulation facility. For this acutely hazardous waste, the container will be removed by the JPC within 72 hours if the quantity exceeds one quart.

Prior to loading the oxidizer, the liquid separator in the DPF vent system will be pressurized to induce flow of the mixture of captured hydrazine and MMH into a 5-gallon container.

This container will be removed by the JPC for reclamation.

The four IABS oxidizer tanks will be loaded with 1,660 pounds of nitrogen tetroxide similarly to fuel loading, with the oxidizer storage container pressurized to induce flow into the IABS oxidizer tanks. Waste handling and preliminary decontamination is similar to the IABS fuel loading operation, with a 14-gallon container for the oxidizer solid waste stream. However, the oxidizer transfer equipment will remain in the DPF until after the launch. The oxidizer storage containers will be returned to FSA-1 by the JPC.

After propellant loading, propellant tanks will be pressurized with helium and the DSCS III/IABS will be moved through the airlock to the East Bay, mated to the launch vehicle adapter, and encapsulated in the payload fairing. The encapsulated payload is then transported to SLC-36A for mating with the Atlas II/Centaur launch vehicle by the launch vehicle contractor. With the exception of continuous battery charging and final ordnance connection, no further processing of the satellite occurs at SLC-36A with the exception of abbreviated functional testing. The total processing time is approximately 100 calendar days. Figure 7 shows the Atlas II launch vehicle.

After the launch, the oxidizer transfer equipment and lines will be decontaminated. The lines will be flushed with potable water into a 55-gallon container. Containers with a sodium bicarbonate solution and potable water will be used for wiping and dipping components. Solid waste will be double-bagged and placed into the 14-gallon oxidizer solid waste container. As with MMH-contaminated solid waste, the oxidizer-contaminated solid wastes are acutely toxic hazardous wastes and will be managed accordingly. The sodium bicarbonate solution and potable water will be poured into the 55-gallon container. The container will be sampled for characterization, neutralized, and discharged, if nonhazardous, to the sanitary sewer in accordance with a variance for disposal of liquid oxidizer wastes.

The fuel transfer equipment for the satellite and IABS will then be moved from the PCF to

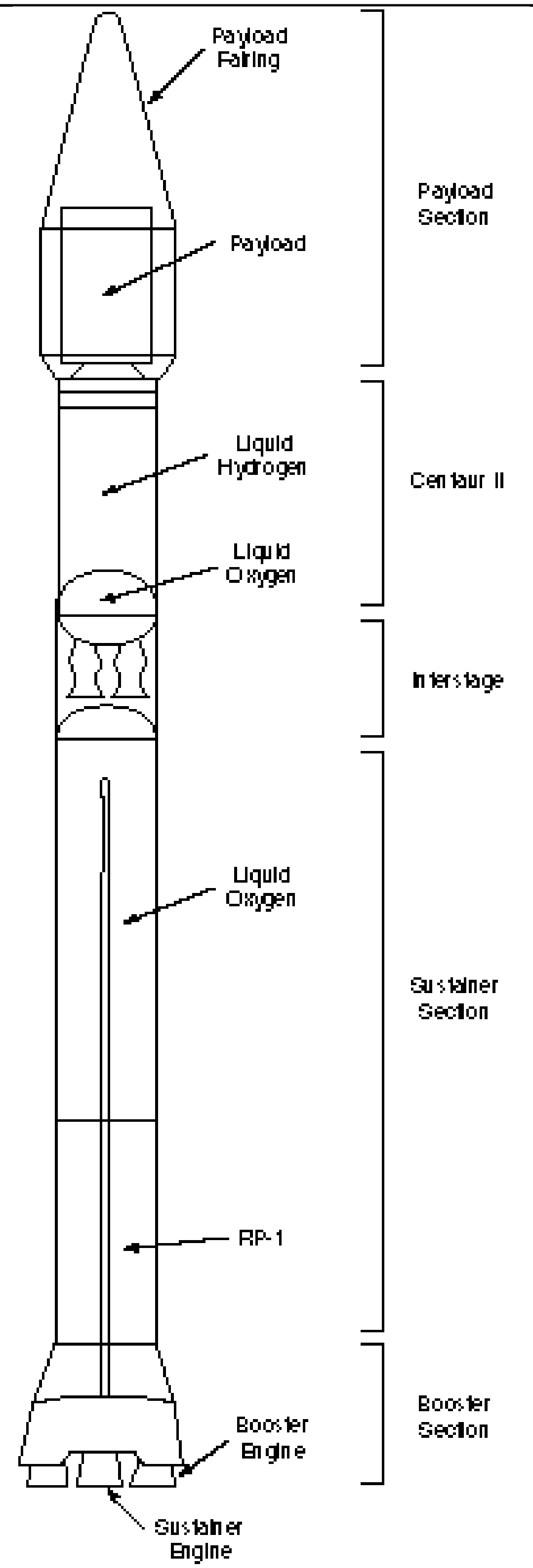

FIGURE 7
ATLAS II LAUNCH VEHICLE

the DPF for decontamination. Decontamination procedures for both sets of equipment are similar, and generate separate waste streams. For each equipment set, the lines will be flushed with potable water into a 55-gallon container, and then flushed with a mixture of isopropyl alcohol (IPA) and demineralized water into another 55-gallon container. Containers with a citric acid solution and potable water will be used for wiping and dipping components. Solid waste will be double-bagged and placed into the 14-gallon hydrazine or MMH solid waste container. The citric acid and potable water dip solutions will be poured into the 55-gallon potable water flush container for each fuel waste stream. The 55-gallon containers will be sampled for characterization and labeling, and moved to the appropriate DPF satellite accumulation points for removal by the JPC.

The contractor performing the propellant loading operations will be responsible for proper identification, containerization, marking, and accumulation of any wastes prior to pickup by the JPC. A subcontractor of the JPC will perform a final decontamination of the propellant transfer equipment at the Kennedy Space Center, and be responsible for proper identification, containerization, marking, and accumulation of any wastes from this final decontamination prior to pickup by the JPC. The propellant transfer equipment will then be returned to the DSF for storage.

2.2.6 Mission Profile

Figure 8 and the following discussion describe a typical mission. The Atlas II launch vehicle injects the DSCS III/IABS into a 26.5º geosynchronous transfer orbit with a period of 10.4 hours. After injection, the Atlas II will orient the DSCS III/IABS to the proper apogee burn attitude, spin to four revolutions per minute (rpm), and separate. Using the satellite thrusters, the spin velocity will be increased to 20 rpm.

At the apogee of the fifth orbit, the IABS will be ignited for approximately 60 minutes to inject the DSCS III/IABS into an intermediate orbit with a period of 23 hours. At the apogee of the ninth orbit, the IABS will be ignited for approximately 80 seconds to refine the final orbit and drift rate. The satellite thrusters will then be used to stop the DSCS III/IABS spin, and the IABS will separate from the DSCS III.

The DSCS III satellite will perform normal sun and earth acquisition, and drift to the orbit test station where a series of halt maneuvers will place it in geosynchronous orbit. The IABS will remain in an orbit approximately 150 nautical miles below geosynchronous orbit. The time when the IABS will reenter the atmosphere is beyond present estimating capabilities, in excess of 1,000 years.

At the end of its approximate 10-year life, the remaining propellant in the DSCS III will be used to boost the satellite to an orbit above geosynchronous orbit where the satellite will be deactivated. The time when the DSCS III will reenter the atmosphere is beyond present estimating capabilities, in excess of 1,000 years.

The booster and sustainer sections of the Atlas II launch vehicle will fall back to the Earth after separation from the Centaur II upper stage. Specific estimates for the orbital life of the Centaur II are not available, but can be assumed to be decades based on the orbital characteristics.

2.3 MISSION

The DSCS program mission is to maintain worldwide, nuclear hardened, limited anti-jam, secure-voice, and high data rate communications in the 3-30 GHz range for the DOD and other government agencies, for stationary and mobile users.

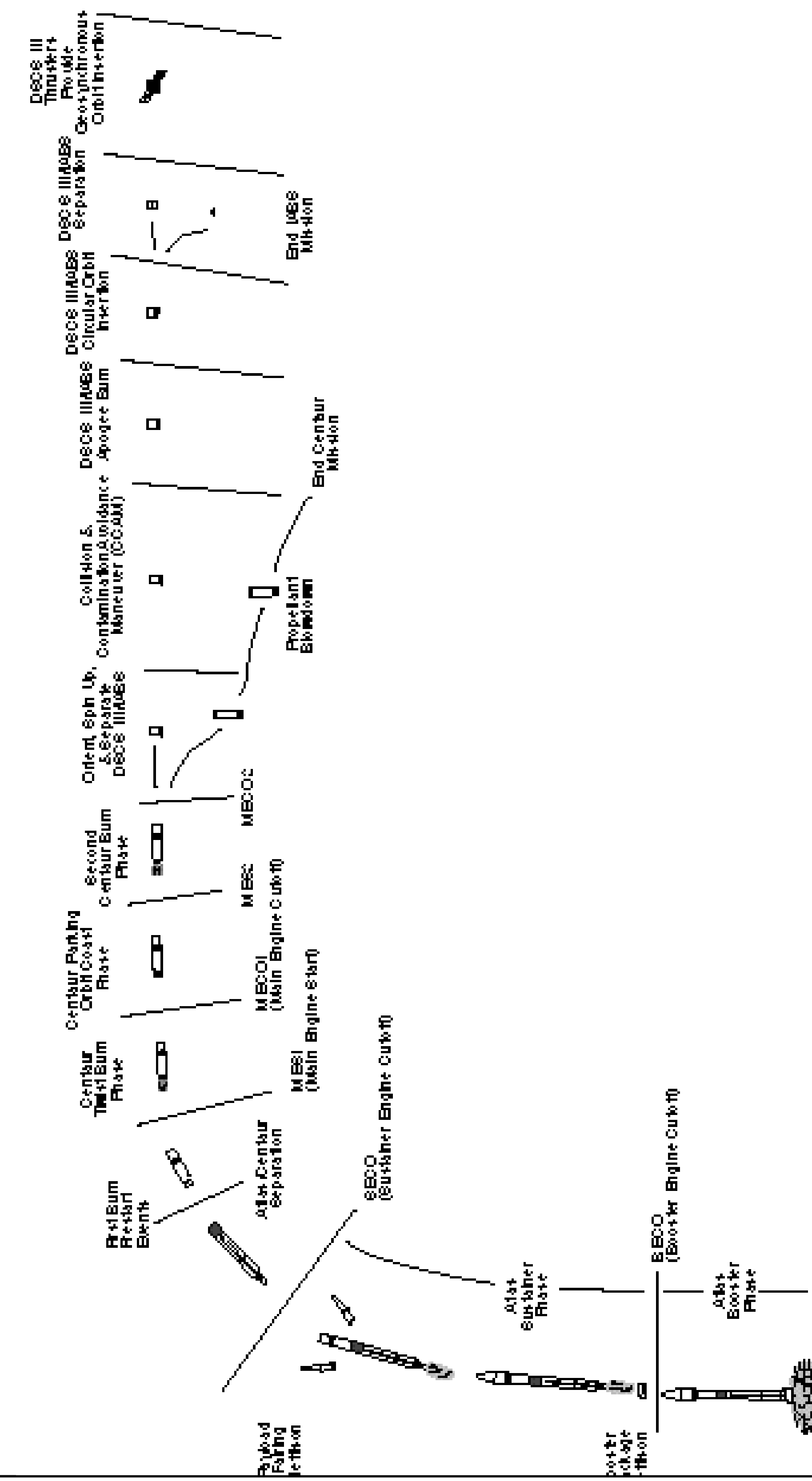

FIGURE 8 DSCS III MISSION PROFILE

2.4 ALTERNATIVES TO THE PROPOSED ACTION

2.4.1 No-Action Alternative

The no-action alternative is continued reliance on the existing on-orbit DSCS satellites with no replenishment until the operational life of the existing satellites is ended.

2.4.2 Other Alternatives Eliminated from Consideration

Vandenberg Air Force Base (AFB), California, is the only alternative location for processing and launching DSCS III satellites in the United States. Generally, the environmental effects would be similar to those experienced at Cape Canaveral AS if existing facilities could be utilized. However, the orbital requirements would call for a launch path over populated areas, with attendant safety concerns that could not be mitigated. Therefore, the Vandenberg AFB alternative will not be considered further.

Previous DSCS satellite designs are alternatives to the DSCS III. However, the previous designs do not meet modified mission requirements and will not be considered further in this EA.

Any alternative satellite designs would have substantially similar environmental effects.

A ground-based system is not a reasonable alternative due to the unavailability of sites in many areas of the world.

2.5 MITIGATION MEASURES

No impacts have been identified which would require mitigation.

2.6 SUMMARY OF IMPACTS

Table 1 contains a matrix summarizing the effects of the proposed action.

Table 1 Effects of the Proposed Action

Air Quality	Total emissions are low and would not cause a violation of the national or Florida ambient air quality standards. Prelaunch processing quantities are less than those considered de minimis by EPA under its Clean Air Act conformity regulations. A conformity analysis is not required since the Cape Canaveral AS area is in attainment.
Stratospheric Ozone	No Class I ODCs will be used for prelaunch processing. The only Class II ODCs are for facility air conditioning systems. Operation and disposal will not adversely affect stratospheric ozone.
Hazardous Materials	Handling and use of hazardous materials in accordance with applicable regulations would not adversely affect personnel or the natural environment. Spill prevention and control measures will minimize the possibility of accidents and the risk associated with potential spills.
Hazardous Waste	Prelaunch processing will generate up to an estimated 4,652 pounds of hazardous waste per year, which is approximately one percent of the hazardous waste produced at Cape Canaveral AS. All hazardous and regulated wastes will be managed and disposed of in accordance with applicable federal, state, local, and Air Force regulations, as well as 45th Space Wing management plans. Waste minimization will be employed by contractors.
Solid Waste	Prelaunch processing and program operations will produce an estimated 26.5 tons of solid waste per year, which is approximately 0.76 percent of the current solid waste produced at Cape Canaveral AS.
Pollution Prevention	The satellite contractor and the Air Force will comply with the pollution prevention management plan under development for Cape Canaveral AS.
Nonionizing Radiation	Radio frequency radiation will either be non-hazardous or controlled so that no personnel are exposed to hazardous levels.
Ionizing Radiation	The thoriated magnesium panels on the satellite are low-level sources of radiation and would not be hazardous unless particles were ingested. No processing operations would generate hazardous particles.
Water Quality	Wastewater will be disposed of in accordance with permit conditions, minimizing adverse effects. Prevention and control of spills of hazardous materials in accordance with 45 SW OPlan 19-1 will minimize impacts on water quality
Biological Communities	The proposed action will utilize existing facilities engaged in activities similar to the proposed action and will not affect existing biological communities or any habitat that would have been utilized by threatened or endangered species beyond current operational impacts.
Cultural Resources	No renovation or construction activities would occur under the proposed action that would affect cultural resources.
Noise	Prelaunch processing operations will not produce hazardous noise levels. Noise impacts from launch are addressed in the EA for the launch vehicle.
Socioeconomics	The 17 permanent personnel represent approximately 0.23 percent of the Cape Canaveral AS work force. Additional office or work space for transient personnel is not needed.
Utilities	Utility usage would be essentially unchanged from current baseline conditions.
Orbital Debris	The proposed action will fractionally increase the total amount of debris in orbit. The DSCS III and IABS will be placed in disposal orbits at the end of their missions.
Safety	The proposed action will be conducted in accordance with safety plans and regulations to minimize risks.

SECTION 3.0

AFFECTED ENVIRONMENT

The level of detail of the baseline data presented in the following sections reflects the likelihood and significance of potential impacts.

3.1 AIR QUALITY

3.1.1 Meteorology

The climate of Cape Canaveral AS is characterized by long, relatively humid summers and mild winters. Owing to its location adjacent to the Atlantic Ocean and the Indian and Banana Rivers, annual variations in temperature are moderate. The annual average temperature at Cape Canaveral AS is 71 degrees Fahrenheit (°F) (USAF, 1989a).

Rainfall distribution is seasonal, with a wet season occurring from May to October, while the remainder of the year is relatively dry. Average annual rainfall for Cape Canaveral AS is 48.5 inches, 70 percent of which occurs from May through October at the rate of approximately 5 inches per month (USAF, 1989a). The Cape Canaveral area has the highest number of thunderstorms in the United States, and one of the highest frequencies of occurrence in the world during the summer. On average, thunderstorms occur 76 days per year at Cape Canaveral. Between May and September, thunderstorms can be expected more than 10 days per month (USAF, 1989a). During the summer months, lightning detection systems indicate that 1,400 ± 840 cloud strikes occur per month on the 135-square mile Kennedy Space Center (NASA, 1990).

3.1.2 Local Air Quality

As required by the Clean Air Act (CAA) and its amendments, the United States Environmental Protection Agency (EPA) has promulgated regulations that set National Ambient Air Quality Standards (NAAQS). Two classes of standards were established: primary and secondary. Primary standards define levels of air quality necessary to protect public health with an adequate margin of safety. Secondary standards define levels of air quality necessary to protect public welfare (i.e., soils, vegetation, and wildlife) from any known or anticipated adverse effects of a pollutant.

National and Florida ambient air quality standards are currently in place for six pollutants (known as “criteria pollutants”): carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), sulfur oxides (SO_X [measured as sulfur dioxide, SO_2]), lead (Pb), and particulate matter smaller than 10 micrometers (PM-10). The state of Florida has adopted the NAAQS except for SO_2. The state requires the NAAQS be met at ambient air, defined as air that is accessible to the general public. National and state primary and secondary air quality standards are presented in Table 2. Although ozone is considered a criteria pollutant and is measurable in the atmosphere, it is not often considered as a pollutant when reporting emissions from specific sources. Ozone is not typically emitted directly from most emissions sources. Ozone is formed in the atmosphere from its precursors, nitrogen oxides (NO_x) and volatile organic compounds (VOC), which are directly emitted from various sources. Thus, emissions of NO_X

Table 2 State and National Ambient Air Quality Standards

Pollutant	Averaging Time	Florida Standard[a,b,c]	National Standards[a,b,c]	
			Primary[e]	Secondary[f]
Sulfur dioxide	Annual	60 µg/m^3 (0.02 ppm)	80 µg/m^3 (0.03 ppm)	
	24-hour	260 µg/m^3 (0.10 ppm)	365 µg/m^3 (0.14 ppm)	
	3-hour	1300 µg/m^3 (0.5 ppm)		1300 µg/m^3 (0.50 ppm)
Particulate Matter	Annual	50 µg/m^3[(d)]	50 µg/m^3[(d)]	50 µg/m^3[(d)]
PM-10	24-hour	150 µg/m^3[(d)]	150 µg/m^3[(d)]	150 µg/m^3[(d)]
Carbon monoxide	8-hour	10 mg/m^3 (9 ppm)	10 mg/m^3 (9 ppm)	
	1-hour	40 mg/m^3 (35 ppm)	40 mg/m^3 (35 ppm)	
Ozone	1-hour	235 µg/m^3 (0.12 ppm[d])	235 µg/m^3 (0.12 ppm[c])	235 µg/m^3 (0.12 ppm[d])
Nitrogen dioxide	Annual	100 µg/m^3 (0.05 ppm)	100 µg/m^3 (0.053 ppm)	100 µg/m^3 (0.053 ppm)
Lead	Quarterly	1.5 µg/m^3	1.5 µg/m^3	1.5 µg/m^3

Notes:

a. National and state standards, other than ozone and those based on an annual/quarterly arithmetic mean, are not to be exceeded more than once per year. The ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than 1.

b. All measurements of air quality are corrected to a reference temperature of 25 degrees C and to a reference pressure of 760 millimeters of mercury. µg/m^3 refers to micrograms per cubic meter. ppm refers to parts per million of volume. mg/m^3 refers to milligrams per cubic meter.

c. Arithmetic average.

d. Attainment determinations will be made on the criteria contained in 40 CFR 50, July 1, 1987.

e. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health. Each state must attain the primary standards no later than 3 years after the state's implementation plan is approved by the EPA.

f. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. Each state must attain the secondary standards within a “reasonable time” after the implementation plan is approved by the EPA.

and VOCs are commonly reported as criteria pollutants instead of ozone.

The air quality at Cape Canaveral AS is considered good since there are few air pollution sources in the local area. Cape Canaveral AS is located in the federally defined Central Florida Intrastate Air Quality Control Region (AQCR 48). The AQCR consists of the following counties: Brevard, Lake, Orange, Osceola, Seminole, and Volusia. AQCR 48 is classified by EPA as an attainment area for all of the criteria pollutants. Attainment means that the air quality in an area is equal to or better than the NAAQS.

Section 176(c) of the CAA states that no federal department or agency shall support or approve any activity or action that does not conform to an approved State Implementation Plan (SIP) or Federal Implementation Plan (FIP). On November 30, 1993, the EPA promulgated final rules on conformity of general federal projects. A separate rule addressed transportation programs developed under the Federal Transit Act. The general conformity rules, included in 40 Code of Federal Regulation (CFR) Parts 6, 51, and 93, apply to areas that are nonattainment or maintenance for the NAAQS and where a SIP has been adopted.

Accurate emissions inventories are needed for estimating the relationship between emissions

sources and air quality. An emissions inventory is an estimate of total mass emissions of pollutants generated from a source or sources over a period of time, typically a year. Baseline emissions of criteria pollutants for Brevard County for 1993 are summarized in Table 3. The Brevard County emissions inventory accounts for permitted stationary and point sources that are required to report annual emissions to the Florida Department of Environmental Protection (FDEP). This inventory includes all permitted air emissions source at Cape Canaveral AS, including permitted power generators, boilers, paint booths, and propellant loading operations, among others. An effort is currently underway to develop a complete inventory of all air emissions sources (both permitted and nonpermitted) at Cape Canaveral AS (Potter, 1995).

Table 3 Baseline Criteria Pollutant Emissions for Brevard County, Florida

Pollutant	Tons per Year
Nitrogen oxides	9,498
Sulfur oxides	32,943
Carbon monoxide	960
Particulate matter	2,366
Volatile organics	581
Lead	Not reported

Source: FDEP, 1995

3.1.3 Stratospheric Ozone

The Earth's atmosphere can be described by a series of four vertical strata or layers distinguished by temperature profile, structure, density, composition, and degree of ionization. The four strata, in ascending order from the Earth's surface are the troposphere, stratosphere, mesosphere, and thermosphere. The boundaries between these atmospheric layers are indistinct and vary with latitude The troposphere extends up from the surface of the earth to a height ranging from 12 kilometers (km) at the equator to 8 km at the poles. The stratosphere extends from the troposphere to about 50 km above the earth's surface. Above 50 km is the mesosphere, a transition zone between the stratosphere and the thermosphere. The mesosphere extends to about 80 km above the Earth's surface. The region overlying the mesosphere is the thermosphere, which largely includes the ionosphere. This is a region of very high vacuum with fewer than 10^{19} molecules per cubic meter compared to 2.5 x 10^{25} molecules per cubic meter at sea level.

The stratosphere is the main atmospheric region of O_3 production. The highest O_3 concentrations are found near the middle of the stratosphere at a height of about 25 km. The concentration of O_3 results from a dynamic balance between O_3 transported by stratospheric circulation and O_3 production/destruction mechanisms. Ozone concentrations vary with stratospheric location. Stratospheric circulation carries O_3 from the equatorial regions, where it is produced primarily by chemical reactions, to other regions of the stratosphere where circulation and heterogeneous chemistry (gas-phase reactions with liquids or solid particles) play an important role.

Even though O_3 is a trace element in the stratosphere, its presence is important because it has the ability to absorb ultraviolet (UV) radiation from the sun. It is able to absorb virtually all UV radiation with wavelengths less than 290 nanometers (nm) and most of the radiation in the harmful 290-320 nm wavelength region (ultraviolet-B [UV-B] region). The stratosphere is considered an important shield against harmful UV radiation. The absorption properties of O_3 present in this layer prevent UV radiation from reaching the Earth's surface in quantities that could be harmful to human health, natural environmental systems, and climate.

Title VI of the Clean Air Act (CAA) Amendments of 1990 reflects Congressional concern that chlorofluorocarbons (CFC), hydrochlorofluorocarbons (HCFC), brominated hydrocarbons (halons), carbon tetrachloride, methyl chloroform, and other chemicals are destroying the stratospheric ozone layer. Even though these chemicals are released in the lower atmosphere (troposphere), their life span is such that they can be transported to the stratosphere through tropospheric mixing. Once in the stratosphere, these compounds are broken down by ultraviolet radiation, produc-

ing highly reactive chlorine and bromine radicals which participate in the catalytic destruction of O_3. Title VI (Sections 602-618 of the Clean Air Act, codified at 42 United States Code 7671a-q) requires the phase-out of production and consumption of ozone-depleting chemicals (ODC), regulates the use and disposal of ODCs, bans nonessential products containing ODCs, requires labeling of products manufactured with and containing ODCs, and regulates their replacement with substitutes so that the stratospheric concentration of chlorine and bromine can be reduced.

The CAA required the Environmental Protection Agency (EPA) to regulate ODCs in two classes. Class I substances include CFCs, halons, carbon tetrachloride, and methyl chloroform. Class II substances are specifically listed HCFCs. EPA is required to add substances to the Class I category if they have an ozone depleting potential (ODP) of 0.2 or greater. The ODP is a factor established by EPA to reflect the ozone-depleting potential of a substance as compared to chlorofluorocarbon-11 (CFC-11). For Class II substances, EPA is required to add any other substance that is known or may reasonably be anticipated to cause or contribute to harmful effects on the O_3 layer.

The actions detailed in Title VI carry out the United States obligations under the “Montreal Protocol on Substances that Deplete the Ozone Layer.” The Montreal Protocol is a treaty, ratified by the U.S. Senate in December 1988, limiting global production and consumption of ODCs. The Montreal Protocol, as embodied in the CAA Amendments of 1990, originally required the production of CFCs to be phased out by January 1, 2000, with the exception of methyl chloroform which had a deadline of January 2, 2002. Also, effective January 1, 2015, it would be unlawful to sell or consume Class II substances without certain restrictions, and their production would be phased out by January 30, 2030.

During 1992, the parties to the Montreal Protocol amended the treaty to reflect recent scientific information on the harmful effects caused by the destruction of stratospheric O_3. The Montreal Protocol now calls for an accelerated phase-out of CFCs, methyl chloroform and carbon tetrachloride by January 1, 1996, with the exception of critical CFC uses. It called for the phase-out of halons by the end of 1993. Finally the protocol calls for the addition of methyl bromine (a broad spectrum pesticide) and hydrobromofluorocarbons (HBFC) as Class I substances with the phase-out of methyl bromide by January 1, 2001, and HBFCs by January 1, 1996. The EPA has elected to accelerate the phase-out of the three Class II HCFCs with the highest ODP: HCFC-141B, HCFC-22, and HCFC-142B. The EPA will ban the production and consumption of HCFC-141B as of January 1, 2003, and the production and consumption of HCFC-142B and HCFC-22 by January 1, 2020. The EPA will ban the production and consumption of all other HCFCs by January 1, 2030. The EPA has incorporated the accelerated phase-out and additions called for by the amendments in its final rule on the protection of stratospheric O_3, published in 58 Federal Register (FR) 65018-65082 (Dec. 10, 1993) and codified at 40 CFR Part 82. Ultimately, the goal is to reverse the observed reduction in global O_3 and limit resulting damage to the Earth from increased UV radiation.

3.2 HAZARDOUS MATERIALS

Hazardous materials management is the responsibility of each individual or organization at Cape Canaveral AS. The primary outlet for hazardous materials purchase and acquisition is through Patrick AFB supply channels. Individual hazardous materials obtained through base supply at Patrick AFB are assigned a code which allows limited tracking of the materials and provides knowledge of hazardous materials usage for industrial hygiene and environmental compliance purposes. Currently, Patrick AFB is developing a pharmacy-style hazardous materials acquisition system in order to improve hazardous materials tracking, reduce amounts of certain hazardous materials used, and reduce the amount of waste generated as result of expired shelf-life materials. Under this system, only specific individuals within an organization will be able to order and sign for hazardous materials. The hazardous materials pharmacy will not store or issue propellants.

Currently, individual contractors at Cape Canaveral AS may also obtain hazardous materials through their own supply organizations, local purchases, or other outside channels. Under the new hazardous materials pharmacy approach, contractors will be required to obtain hazardous materials through the pharmacy whenever possible. Contractors that must obtain hazardous materials through other channels (e.g., products not readily available through standard government supply organizations) will be required to register the materials with the pharmacy's central tracking location prior to bringing the product on the facility. Large quantities of materials obtained outside of the pharmacy system will be required to be stored with pharmacy stock and distributed to the contractor as needed in specified quantities.

Hazardous materials must be handled and stored in accordance with Occupational Safety and Health Administration, Environmental Protection Agency, and Air Force regulations. Bulk-quantity storage of hazardous materials is limited to designated storage areas at Cape Canaveral AS. Smaller, shelf-life items, such as paints and varnishes, are stored in approved petroleum, oil, and lubricant storage cabinets maintained by individual contractors. Hazardous fuels are controlled by the Joint Propellants Contractor (JPC) for 45th Space Wing (45 SW). The JPC provides for the purchase, transport, temporary storage, and loading of hazardous fuels and oxidizers.

Spills of hazardous materials are covered under 45 SW OPlan 19-1, Oil and Hazardous Substances Pollution Contingency Plan, required by 40 CFR 112. Included in OPlan 19-1 are all applicable federal, state, and local contacts in the event of a spill.

The Superfund Amendments and Reauthorization Act (SARA) of 1986 incorporated reporting requirements in Title III. Pursuant to Executive Order 12856, signed August 4, 1993, federal facilities are now subject to these reporting requirements.

Under Section 311 of SARA Title III, facilities which must prepare or have available Material Safety Data Sheets (MSDS) under Occupational Safety and Health Administration regulations are required to submit the MSDSs or a list of MSDSs for materials stored in excess of reporting thresholds to the local emergency planning committee, the state emergency response commission, and the local fire department. Under Section 312, the same facilities must also submit an emergency and hazardous material inventory form (Tier I or Tier II) for each material reported under Section 311. Under Section 313, facilities using over 10,000 pounds of listed toxic chemicals in a calendar year must submit an annual toxic release inventory Form R for each chemical to the Environmental Protection Agency and designated state officials. Cape Canaveral AS was required to submit Section 311 information by August 1994 and Section 312 information by March 1, 1995, for the calendar year (CY) 1994 reporting period. Cape Canaveral AS is required to submit any applicable Section 313 Forms R by July 1, 1995 for the CY94 reporting period.

Contractors and programs operating at Cape Canaveral AS must provide 45 CES/CEV and 45 MDG/SGPB with copies of MSDSs for all hazardous materials proposed for use. Additionally, information on hazardous materials used by contractors or programs must be provided to 45 CES/CEV in accordance with SARA Title III and Clean Air Act Title V reporting requirements.

3.3 HAZARDOUS WASTE

Hazardous waste management at Cape Canaveral AS is regulated under 40 CFR, Parts 260 through 280, and Florida Administrative Code (FAC) 17-730. These regulations are implemented at Cape Canaveral AS through 45 SW OPlan 19-14, Petroleum Products and Hazardous Waste Management Plan. Five main entities are involved in hazardous waste management and disposal for Cape Canaveral AS. These include the generator of the waste, the JPC, the Launch Base Support Contractor (LBSC) for Cape Canaveral AS, the Defense Reutilization and Marketing Office (DRMO) of the Department of Defense, and the environmental support organization at Patrick AFB (45 CES/CEV).

The US Air Force, as the owner of the facilities at Cape Canaveral AS, is considered the generator of hazardous wastes at Cape Canaveral AS, and is responsible for hazardous wastes physically generated by contractors. All hazardous waste generated by contractors at Cape Canaveral AS is labeled with the US Air Force's EPA identification number for Cape Canaveral AS, and it is transported, treated, and disposed under this number. Each individual or organization at Cape Canaveral AS is responsible to the Air Force for identifying, minimizing, packaging, and labeling hazardous waste generated by their activities, as well as requesting sampling and pickup of hazardous waste by the JPC. Additionally, they are responsible for administering all applicable regulations and plans regarding hazardous waste, and for complying with applicable regulations regarding the temporary accumulation of hazardous waste at the process site. Physical generators of hazardous waste are required to submit to the JPC each year a process waste questionnaire technical response package which details the types and amounts of hazardous wastes expected to be generated during the year. The JPC assigns each hazardous waste stream a process waste code so that the waste may be tracked from generation through disposal.

The JPC services include waste determinations sampling, pickup, packaging assistance, technical assistance, and disposal of petroleum products, hazardous wastes, and non-hazardous wastes. The JPC collects and transports hazardous waste from the process site to a 90-day hazardous waste accumulation area, one of three permitted one-year hazardous waste storage facilities at Cape Canaveral AS, or to a licensed disposal facility off-station. They are responsible to the Air Force for providing an operational level of hazardous waste disposal which complies with all applicable regulations governing handling, transport, storage, treatment, and disposal or reclamation of the waste.

The LBSC provides environmental management and technical support for Cape Canaveral AS. The LBSC ensures that contractors have hazardous waste management programs in place, offers hazardous waste training, and reviews and inspects contractors to ascertain compliance with OPlan 19-14 and all applicable federal, state, and local regulations. Additionally, the LBSC operates the permitted hazardous waste storage areas on Cape Canaveral AS, maintains records and inventories of permitted hazardous waste storage and process site accumulation areas, and maintains records pertaining to facility inspections, hazardous waste training, safety training, and other hazardous waste matters.

The DRMO is responsible for managing and marketing excess and recoverable products and waste materials in accordance with applicable regulations. Hazardous items which cannot be marketed by the DRMO are disposed of as hazardous wastes. The DRMO is also responsible for obtaining offsite hazardous and non-hazardous wastes disposal contracts at all downrange sites.

The 45 CES/CEV at Patrick AFB is the environmental support organization which provides oversight of the LBSC at Cape Canaveral AS. 45 CES/CEV acts as the point of contact with regulatory agencies and informs the LBSC and JPC of new policies and policy changes concerning hazardous waste management.

Cape Canaveral AS currently operates three hazardous waste storage facilities (Facility Numbers 44632, 54810, and 55123), and one hazardous waste treatment facility (Facility Number 15305). All are operated under a single five-year Resource Conservation and Recovery Act permit which expires in 1997 (HO05-185569). The three storage facilities are relatively small storage areas which are permitted to store hazardous wastes for up to one year until the waste can be disposed of by the JPC at an off-station location. These storage sites are not permitted to store hydrazine, monomethyl hydrazine, or nitrogen tetroxide hazardous wastes. The wastes must be taken offsite for storage and disposal before temporary accumulation time limits have been reached. Facility 15305, the Explosive Ordnance Disposal Facility, provides thermal treatment of waste explosive ordnance (Byrd, 1994).

Cape Canaveral AS has recently received a notice from FDEP on the intent to issue an operating permit for a single hazardous waste storage

area to replace the existing three. The single storage facility is expected to begin operation in May 1995 and will be permitted to store hazardous wastes for up to one year. Cape Canaveral AS plans to obtain closure permits for the three existing storage areas (Halbert, 1995).

Individual contractors and organizations at Cape Canaveral AS maintain hazardous waste satellite accumulation points and 90-day hazardous waste accumulation areas in accordance with 45 SW OPlan 19-14. Hazardous waste satellite accumulation points are volume-based accumulation sites operated at or near the point of hazardous waste generation. A maximum of 55 gallons per waste stream of hazardous waste (or one quart of acutely hazardous waste) can be accumulated at a satellite accumulation point. Once the volume limit is reached the container of hazardous waste must be dated and moved to a 90-day accumulation area or to a permitted storage facility within 72 hours. Satellite accumulation points have indefinite accumulation times. 90-day hazardous waste accumulation areas are time-based accumulation sites used for temporary accumulation of hazardous waste. Hazardous wastes must be moved from a 90-day accumulation area to a permitted hazardous waste storage, transfer, treatment, or disposal facility within 90 days from the accumulation start date. There is no limit on the volume of hazardous waste that can be accumulated at a 90-day hazardous waste accumulation area.

The contractor for the DSCS III/IABS satellite maintains two hazardous waste satellite accumulation points and no 90-day hazardous waste accumulation areas. The JPC is responsible for collection and transportation of hazardous wastes from this accumulation site.

Cape Canaveral AS reported the generation of 420,662 pounds of hazardous waste in 1993 (Albury, 1995).

3.4 SOLID WASTE

Solid waste management is the responsibility of each individual or organization generating the waste. Solid waste is managed according to the nature and quantity of the waste. The Cape Canaveral AS landfill located near the airstrip is permitted to accept construction debris, demolition debris, and asbestos-containing material. Waste is segregated within the landfill according to waste type (i.e. concrete waste is placed in one section, wood waste in another, etc.). Cape Canaveral AS disposed of 2,340 tons of solid waste in the station landfill in 1994 (Camaradese, 1995).

General solid refuse from daily activities at Cape Canaveral AS is collected by private contractor and disposed off-station at the Brevard County Landfill. The Brevard County Landfill is a Class I landfill that occupies 192 acres near the City of Cocoa. The landfill receives between 2,200 and 2,400 tons of solid waste per day (Hunter, 1994). Cape Canaveral AS disposed of 3,492 tons of solid waste in the Brevard County Landfill and recycled 1,296 tons of solid waste in 1994 (Camaradese, 1995).

3.5 POLLUTION PREVENTION

The Air Force has taken a proactive stance in developing a pollution prevention program (PPP) to implement the regulatory mandates in the Pollution Prevention Act of 1990, Executive Order (EO) 12856 *Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements*, EO 12873 *Federal Acquisition, Recycling, and Waste Prevention*, and EO 12902 *Energy Efficiency and Water Conservation at Federal Facilities.* The Air Force PPP incorporates the following principles in priority order:

- Generation of hazardous substances, pollutants, or contaminants will be reduced or eliminated at the source whenever feasible (source reduction)
- Pollution that cannot be prevented will be recycled in an environmentally safe manner
- Disposal, or other releases to the environment, will be employed only as a last resort and will be conducted in an environmentally safe manner.

Air Force Instruction (AFI) 37-7080, dated 12 May 1994, provides the directive requirements

for the Air Force PPP. AFI 37-7080 incorporates by reference applicable Federal, Department of Defense, and Air Force level regulations and directives for pollution prevention. Each installation shall incorporate the requirements of AFI 37-7080 into a Pollution Prevention Management Action Plan (PPMAP). The PPMAP is a single reference used to manage the actions needed to develop and execute an installation's PPP. Installation PPMAPs will address the process required to run a PPP; the program required to fund pollution prevention programs; the road map to achieve Air Force pollution prevention goals; and the actions required to execute the PPP. Plans are based on recurring opportunity assessments designed to continually evaluate an installation's success in achieving pollution prevention at the highest level in the hierarchy of actions. The PPMAP will incorporate management strategies for meeting the goals of the following elements of the Air Force PPP:

- Reduction of ozone depleting chemicals (ODCs) in accordance with the action memorandum dated 7 January 1993, including complete elimination of Class I ODCs and reduction of Class II ODCs by specified target dates using CY92 as the baseline.
- Reduction of EPA 17 industrial toxics by 50 percent by the end of 1996 from a CY92 baseline to comply with EPA's Industrial Toxics Program.
- Reduction of hazardous waste disposal (in accordance with AFI 32-7042) by 25 percent by the end of 1996 and 50 percent by the end of 1999 from a CY92 baseline using source reduction whenever possible followed by reclamation and recycling.
- Reduction of municipal solid waste disposal (in accordance with AFI 32-7042 and AFI 32-7080) by 10 percent by 1993, 30 percent by 1996, and 50 percent by 1997 from a CY92 baseline using segregation and recycling of wastes, including paper, plastic, metals, glass, used oil, lead acid batteries, and tires.
- Affirmative procurement of environmentally friendly products in accordance with EO 12873. 100 percent of all products purchased by an installation each year in each of EPA's “Guideline Item” categories shall contain recycled materials meeting EPA's Guideline Criteria. Guideline items include paper, retread tires, building insulation, cement/concrete containing fly ash, and re-refined oils.
- Implementation of energy conservation in accordance with EO 12902, including reduction of facility energy (natural gas, coal, electricity, fuel oil, etc.) 10 percent by 1995, 20 percent by 2000, and 25 percent by 2005 with 1985 consumption as the baseline.

Each installation will be required to incorporate appropriate management, measurement, and reporting goals within the PPMAP to comply with all elements of the Air Force PPP.

The Superfund Amendments and Reauthorization Act (SARA) was passed in 1986. Title III of SARA was the Emergency Planning and Community Right-to-Know Act (EPCRA), which added significant public notification and reporting requirements to the Comprehensive Environmental Response, Compensation, and Liability Act, most notably toxic chemical release inventory reporting. EO 12856, signed 4 August 1993, requires federal facilities previously exempt from EPCRA to comply with the reporting requirements of all sections of EPCRA no later than for the reporting period of calendar year 1994.

Cape Canaveral AS is currently developing a PPMAP to incorporate the elements of the Air Force PPP. The PPMAP is scheduled to be completed prior to 31 December 1995.

3.6 NONIONIZING RADIATION

Nonionizing radiation is electromagnetic radiation emitted at wavelengths whose photon energy is not high enough to ionize or “charge” an absorbing molecule (i.e. human tissue). Nonionizing radiation is considered to be that part of the electromagnetic radiation spectrum with wavelengths greater than 10^{-7} meters and consists primarily of near ultraviolet radiation, visible radiation or light, infrared radiation, and radio frequency (RF) radiation. RF radiation accounts for the largest range of frequencies

among the various types of nonionizing radiation and is used extensively to transmit radio, television, and radar signals. RF radiation has a frequency range of 10 kilohertz to 300 gigahertz.

Numerous RF radiation sources exist throughout Cape Canaveral AS. These are typically in the form of transmitting antennas which support various space and launch vehicle programs. RF radiation hazards can exist when there is sufficient power contained in the incident radiation from these antennas to cause damage to humans. Humans are affected when RF radiation agitates the molecules of the body, causing them to vibrate and rotate faster than normal. This accelerated motion produces heat. When exposure to RF radiation ends, the additional molecular agitation stops.

The human body's thermoregulatory system can compensate for heat produced at low levels of RF radiation. However, higher intensities of RF radiation over a prolonged period of time could cause heating that could not be adequately regulated. Thermal distress or damage could occur.

Standards to limit RF radiation hazards are expressed in the form of permissible exposure levels (PEL). A PEL is the exposure level in milliwatts per square centimeter (mW/cm^2) to which an individual may be repeatedly exposed, and which, under the conditions of exposure, will not cause detectable bodily injury regardless of age, gender, or child-bearing status. Air Force Occupational Safety and Health Standard 48-9 establishes PELs for RF radiation averaged over a six-minute exposure time based on the frequency of the emitted radiation. PELs are used to determine "safe distances" from RF sources beyond which RF radiation hazards will not occur.

All activities generating nonionizing radiation must be coordinated with the base radiation office (45 ADMS/SGPH) and base safety (45 SW/SG) for compliance with Air Force, DOD, and federal regulations regarding radiation protection.

Antennas located on the DPF, the EVCF on the SAB, the TVCF, and the DSCS III/IABS satellite will produce RF radiation during prelaunch processing activities.

3.7 IONIZING RADIATION

Ionizing radiation is photons or particles which have sufficient energy to produce ionization or "charging" in their passage through a substance. Ionizing radiation is considered to be that part of the electromagnetic radiation spectrum with wavelengths less than 10^{-7} meters and includes gamma rays, X-rays, alpha and beta rays, and far ultraviolet radiation. Hazards from ionizing radiation are most commonly associated with emissions from radioactive substances.

All activities generating ionizing radiation must be coordinated with the base radiation office (45 ADMS/SGPH) and base safety (45 SW/SG) for compliance with Air Force, DOD, and federal regulations regarding radiation protection.

There are no naturally occurring radioactive substances at Cape Canaveral AS. However, the DSCS III structure includes thoriated magnesium panels, which are a low-level radiation source.

3.8 WATER QUALITY

Cape Canaveral AS is located on the Canaveral Peninsula, which is a barrier island between the Atlantic Ocean and the Banana River. The majority of ground surface at Cape Canaveral AS is composed of former sand dunes. The surface soils generally consist of highly permeable sand and shell (USAF, 1994a). Surface drainage generally flows west into the Banana River, even near the eastern side of the peninsula. None of the facilities used in prelaunch processing are within the 100-year flood plain.

3.8.1 Groundwater Quality

Two aquifer systems underlay Cape Canaveral AS, the surface aquifer and the Floridan aquifer. The surface aquifer system, which is composed generally of sand and marl, is under unconfined conditions and is approximately 70 feet thick. The water table in the surface aquifer is generally located a few feet below the ground surface. Recharge to the surface

aquifer is principally by precipitation. Groundwater in the surface aquifer at Cape Canaveral AS generally flows to the west except along the extreme east coast of the peninsula (USGS, 1962).

A confining unit composed of clays, sands, and limestone separates the surface aquifer from the underlying Floridan aquifer. The confining unit is generally 80 to 120 feet thick. The relatively low hydraulic conductivity of the confining unit restricts the vertical exchange of water between the surface aquifer and the underlying confined Floridan aquifer.

The Floridan aquifer is the primary source of potable water in central Florida. The Floridan aquifer is composed of several carbonate units with highly permeable zones. The top of the first carbonate unit occurs at a depth of approximately 180 feet below ground surface, and the carbonate units extend to a depth of several hundred feet. Groundwater in the Floridan aquifer at Cape Canaveral AS is highly mineralized, and therefore is not used as a source of drinking water.

3.8.2 Surface Water Quality

Cape Canaveral AS is located in the Florida Middle East Coast Basin (United States Geological Survey Hydrologic Unit 030802020). The Middle East Coast Basin contains three major bodies of water in proximity to Cape Canaveral AS: the Banana River to the immediate west, Mosquito Lagoon to the north, and the Indian River to the west, separated from the Banana River by Merritt Island. All three water bodies are estuarine lagoons with circulation provided mainly by wind-induced currents.

Studies indicate that ambient conditions in the Banana River, Indian River, and Mosquito Lagoon are typical of estuarine waters, with the exception of some areas affected by point source loading (FDEP, 1992; BC, 1991). Levels of aluminum, silver, and iron have been reported in excess of state criteria, but seem to be indicative of background concentrations due to their widespread distribution as well as the high level of organic particulate matter found in the area (BC, 1991).

The FDEP has classified water quality in the Middle East Coast Basin as “poor to good” based on the physical and chemical characteristics of the waters as well as whether they meet their designated use under FAC 17-3. The upper reaches of the Banana River adjacent to Cape Canaveral AS and the lower reaches of Mosquito Lagoon have generally good water quality due to lack of urban and industrial development in the areas. Lower reaches of the Banana River and Indian River, upper reaches of Mosquito Lagoon, and eastern portions of the Indian River along Merritt Island are classified as fair. Areas of poor water quality exist along the western portions of the Indian River near the City of Titusville and in Newfound Harbor near Sykes Creek in southern Merritt Island. Fair and poor areas are influenced primarily by wastewater treatment plant effluent discharges and urban runoff (FDEP, 1992). Beginning in 1995, discharge of wastewater effluent to the Banana and Indian Rivers will no longer be permitted. Cape Canaveral AS has constructed a new wastewater treatment plant for compliance with this requirement.

Several water bodies in the Middle East Coast Basin have been designated Outstanding Florida Water (OFW) in FAC 17-3, including most of Mosquito Lagoon and the Banana River, Indian River Aquatic Preserve, Banana River State Aquatic Preserve, Pelican Island National Wildlife Refuge, and Canaveral National Seashore (FDEP, 1992). The OFW designation affords water bodies the highest level of protection, and any compromise of ambient water quality is prohibited. Additionally, the Indian River Lagoon System has been designated an Estuary of National Significance by the Environmental Protection Agency. Because of these designations as well as other Florida regulations designed to minimize wastewater discharges and urban runoff in the area, water quality in the Middle East Coast Basin is expected to improve.

In April 1994, the Cape Canaveral AS storm water pollution prevention plan was finalized. The National Pollutant Discharge Elimination System group storm water permit has not been issued by the EPA as of the date of this assessment. Storm water discharges are also regulated by the Saint Johns River Water

Management District. Cape Canaveral will continue to obtain storm water permits for individual facilities or construction projects as necessary from the EPA and Saint Johns River Water Management District.

3.9 BIOLOGICAL COMMUNITIES

Near-natural conditions have been retained at Cape Canaveral AS by restricting activities on the station. The majority of the complex consists of vegetation indigenous to the Florida coastal scrub (9,400 acres), coastal strand (2,300 acres), and coastal dune (800 acres) plant communities. Wetlands at Cape Canaveral AS represent a minor percentage of the total land area, with 20 acres of freshwater wetlands, 450 acres of mangrove swamp, and 140 acres of salt marsh (George, 1987). Hammocks at Cape Canaveral AS are small in size, totaling less than 200 acres. Figure 9 shows vegetation communities at Cape Canaveral AS.

The hammock communities on Cape Canaveral AS are characterized by three layers of vegetation: a tree layer with a closed canopy, a shrub layer, and an herb layer. A herb layer is comprised of vegetation that does not develop persistent woody tissue. Tree species of red bay, live oak, Chapman oak, and cabbage palm may reach heights from 5 to 20 meters. Shrub species such as saw palmetto and stopper have profiles from 0.5 to 3 meters in height in this community. An herbaceous layer of vegetation is always present, but the extent of its development is determined by light, water, and soil conditions.

Forty-six special status plant and animal species are associated with Cape Canaveral AS, as shown in Table 4. US Fish and Wildlife Service (USFWS) and Florida Game and Fresh Water Fish Commission (FGFWFC) status and sightings are included in this table. Sea turtles and turtle hatchlings are affected by exterior lights. To minimize impacts to sea turtles, Cape Canaveral AS has implemented a lighting policy (included as Appendix A) for management of exterior lights at the installation. This policy requires the use of low-pressure sodium lights unless prohibited by safety or security purposes. Each complex has a light management plant to protect sea turtles, including SLC-36.

The sea turtle nesting summary report for 1994 for Cape Canaveral AS (Leach, 1994) includes the latest Cape Canaveral AS data as a participant in the FDEP Index Nesting Beach Survey. It documents the results of beach restoration, predator control, and light shielding of sea turtle nests. The Cape Canaveral AS beaches provide prime nesting habitat for green and loggerhead sea turtles. For the ten years of survey data, 1994 was the second highest in nesting activity for both species.

3.10 CULTURAL RESOURCES

Cape Canaveral AS has been the subject of numerous intensive historic and archaeological surveys in recent years. Among these surveys have been studies by Resource Analysts, Inc., for the Air Force (Barton and Levy, 1984; Levy, Barton, and Riordan, 1984) and more recent and ongoing cultural resource evaluations for National Register eligibility conducted by the Environmental Resources Planning Section of the US Army Corps of Engineers, Mobile, Alabama.

SLC-36 was among 21 launch complexes identified as potentially eligible for the National Register of Historic Places (Barton and Levy, 1984). A memorandum of agreement between the Air Force, the Florida State Historic Preservation Officer, and the Advisory Council on Historic Preservation dated February 1, 1989, required documentation prior to any alternation, dismantling, demolition, or removal action that could affect SLC-36. In 1994, the Corps of Engineers finalized historical documentation of SLC-36 in accordance with the standards of the Secretary of the Interior (George, 1995).

The PCF is located on SLC-14, which is a National Historic Landmark site which contributes to the National Historic Landmark District at Cape Canaveral AS (George, 1995). The National Historic Landmark District is comprised of seven non-contiguous sites including SLC-14, SLC-19, SLC-34, the service structure at SLC-13, SLC-26, SLC-5-6, and the Mission Control Center. None of the other facilities that will be used for satellite processing operations are currently considered eligible

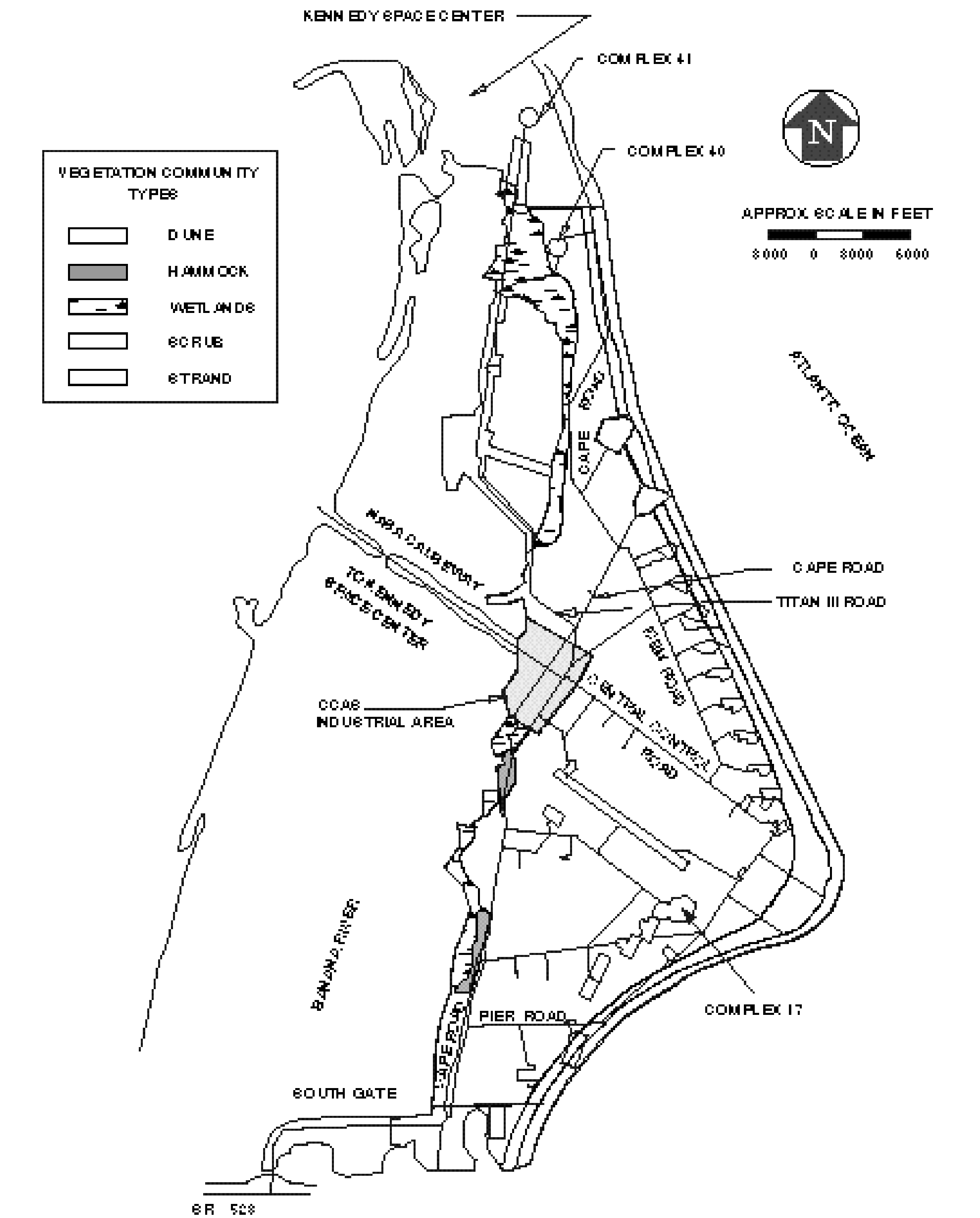

FIGURE 9
VEGETATION COMMUNITIES AT CAPE CANAVERAL AIR STATION

Table 4 Special Status Species Associated with Cape Canaveral AS

Scientific Name	Common Name	STATUS[1] USFWS[2]	FGFWFC[3]	Cape Canaveral[4]
Amphibians and Reptiles:				
Alligator mississippiensis	American alligator	T(S/A)	SSC	o
Caretta caretta caretta	Atlantic loggerhead turtle	T	T	o
Chelonia mydas mydas	Atlantic green turtle	E	E	o
Dermochelys coriacea	Leatherback turtle	E	E	o
Drymarchon corais couperi	Eastern indigo snake	T	T	o
Gopherus polyphemus	Gopher tortoise	UR2	SSC	o
Lepidochelys kempi	Atlantic ridley turtle	E	E	o
Nerodia fasciata taeniata	Atlantic salt marsh snake	T	T	n/o
Rana areolata	Gopher frog	UR2	SSC	n/o
Birds:				
Ajaia ajaja	Roseate spoonbill	--	SSC	o
Aphelocoma coerulescens coerulescen	Florida scrub jay	T	T	o
Charadrius melodus	Piping plover	T	T	o
Dendroica kirtlandii	Kirtland's warbler	E	E	n/o
Egretta thula	Snowy egret	--	SSC	o
Egretta tricolor	Louisiana heron	--	SSC	o
Ethene cuniculeria	Burrowing owl	--	SSC	o
Falco peregrinus tundrius	Arctic peregrine falcon	T	T	o
Falco sparverius paulus	Southeastern American kestrel	UR2	T	n/o
Florida oaerules	Little blue heron	--	SSC	o
Grus canadenis pratensis	Florida sandhill crane	--	T	o
Haematopus palliatus	American oyster catcher	--	SSC	o
Haliaeetus leucocephalus	Bald eagle	E	T	o
Mycteria americana	Wood stork	E	E	o
Pandion haliaetus	Osprey	--	SSC	o
Pelecanus occidentalis	Brown pelican	--	SSC	o
Polyborus plancus audubonii	Audubon's crested caracara	T	T	n/o
Sterna antillarum	Least tern	--	T	o
Mammals:				
Peromyscus floridanus	Florida mouse	UR2	SSC	o
Peromyscus polionotus niveiventris	Southeastern beach mouse	T	T	o
Trichechus manuatus latriostris	West Indian manatee	E	E	o

Table 4, continued

Scientific Name	Common Name	Status[1]	Listing Agency[5]	Status at Cape Canaveral[4]
Plants:				
Acroatichum danaeifolium	Giant leather fern	T	FDA	o
Asclepias curtissii	Curtis milkweed	E	FDA	n/o
Cocoa nuvifera	Coconut palm	T	FDA	o
Avicennia germinans	Black mangrove	SP	FCREA	o
Azolla caroliniana	Mosquito fern	T	FDA	o
Ernodea littoratis	Beach creeper	T	FDA	o
Elophia alta	Wild coco	T	FDA	o
Hymenocallis latifolia	Broad-leaved spiderlily	UR	USFWS, FNAI	o
Peraea borbonia var. humilis	Dwarf redbay	UR	USFWS, FNAI	n/o
Opuntia compressa	Prickly pear cactus	T	FDA	n/o
Opuntia stricta	Prickly pear cactus	T	FDA	o
Osmuda regalis var. spectabilis	Royal fern	C	FDA	n/o
Remirea maritima	Beach star	E	FDA, FNAI	o
Scaevola plumeria	Scaevola	T	FDA	o
Tillandsia simulata	Wildpine; air plant (unnamed)	T	FDA	n/o
Tillandsia utriculata	Giant wildpine; giant air plant	C	FDA	o

1 E = Endangered; T = Threatened; T(S/A) = Threatened due to Similarity of Appearance; SSC = Species of Special Concern; UR2 = Under review, but substantial evidence of biological vulnerability and or threat is lacking; C = Commercially Exploited.

2 U.S. Fish and Wildlife Service

3 Florida Game and Freshwater Fish Commission

4 o = observed; n/o = not observed

5 Listing agencies: FDA = Florida Department of Agriculture and Consumer Services; FCREA = Florida Committee on Rare and Endangered Plants and Animals; FNAI = Florida Natural Areas Inventory; USFWS = United States Fish and Wildlife Service

for the National Register of Historic Places (George, 1995).

3.11 NOISE

The primary noise generators at Cape Canaveral AS prelaunch processing sites are support equipment, vehicles, and air conditioners. Occasionally, increased noise levels are experienced on a short-term basis when launches occur at one of the launch complexes. Ambient conditions in the prelaunch processing areas are typical of those for an urban commercial business or light industrial area.

3.12 SOCIOECONOMICS

3.12.1 Demography

Prior to 1950 the population of Brevard County was predominantly rural. Activation of Cape Canaveral AS in the 1950s brought military personnel into the county. From 1950 to 1960, the total population of Brevard County grew from 23,500 to 111,500. In the 1990 census, Brevard County's population was 398,978. The preliminary projected 1995 population for Brevard County is 452,737, a 13.5 percent increase (University of Florida, 1992). Principal urban centers are located in the cities of Melbourne (61,295), Titusville (39,738), Palm Bay (65,015), and Cocoa (17,724) (BCRCD, 1988). By the year 2000, the county's population is projected to reach 504,263, an increase of about 11.4 percent over current levels (University of Florida, 1992).

Most military personnel at Cape Canaveral AS and Patrick AFB live in Brevard County. About 95 percent of Air Force civilian contractor personnel live in Brevard County. The remainder live in Orange County, Indian River County, and other nearby counties. Most of the people working on the base are employed by companies involved in launch vehicle testing and space launch operations. These employees live in surrounding communities. Cape Canaveral AS currently has a work force of 7,500 persons.

3.12.2 Housing

In 1990, there were 185,150 housing units in Brevard County. Vacancy rates over Brevard County averaged 12.2 percent, with a vacancy rate of 29.2 percent in the Cape Canaveral area. The average household in Brevard County in 1991 included 2.42 persons (University of Florida, 1992). No housing exists at Cape Canaveral AS. The nearest significant residential areas are Cocoa Beach and Merritt Island.

3.12.3 Economy

The total labor force in Brevard County in 1991 was 199,929, and the unemployment rate was 7.1 percent (University of Florida, 1992). In addition to resident employees, many people commute from surrounding areas to work in the county. Services, manufacturing, retail trade, and government-related enterprises are the principal means of employment. Major employers are the Kennedy Space Center, Port Canaveral, Cape Canaveral AS, and aerospace firms.

The total personal income of Brevard County residents in 1990 was $7.1 billion. The 1990 average annual salary in Brevard County was $22,119 (University of Florida, 1992).

3.12.4 Schools

Public schools in Brevard County are part of a county-wide, single-district school system with seventy-three schools and over 60,421 students in the 1992-1993 academic year. The school system has been growing since 1982, and capacity has been exceeded in some parts of central Brevard County. Growth in the district is expected to average 4 percent through 1996, the last year of school board projections.

3.12.5 Public Safety

Police departments in the five municipalities of central Brevard County have 2.36 officers per 1,000 people, and fire protection has 2.17 full-time officers per 1,000 people (CBAEDC, 1992). Police and fire services at Cape Canaveral AS are provided by the launch base support contractor and include mutual agreements with other jurisdictions, particularly the city of Cape Canaveral and Kennedy Space Center, and Brevard County. Disaster control is performed in accordance with 45 SW OPlan 355-1, Disaster Preparedness Operations Plan.

3.12.6 Health Care

Cape Canaveral AS is equipped with a dispensary operated under a joint contract (National Aeronautics and Space Administration and Air Force) to handle accident cases, physical examinations, and emergencies involving the work force. Additional medical services are available at the Air Force Space Command Hospital, Patrick AFB, and at four hospitals in the Cape Canaveral AS area at Cocoa Beach, Rockledge, Titusville, and Melbourne. There are mutual aid agreements with NASA and Brevard County

for catastrophic events, and Brevard County Disaster control is performed in accordance with 45 SW OPlan 355-1, Disaster Preparedness Operations Plan.

3.12.7 Transportation

Transportation in the region is served by highway, rail, airport, and harbor facilities. Federal, state, and local roads provide highway service for Brevard County. Principal routes are Interstate 95, US Highway l, and State Routes A1A, 407, 520, and 528. Bridges and causeways link the urban areas on the beaches to Merritt Island and the mainland. The Florida East Coast Railway affords rail service to the county, with a main line through the cities of Titusville, Cocoa, and Melbourne. Spur rail lines serve other parts of the county, including Cape Canaveral AS. Several commercial and general aviation airports are located in the vicinity of Cape Canaveral AS, the closest being Melbourne Regional Airport, approximately 30 miles south of the base. Port Canaveral, located at the southern boundary of Cape Canaveral AS, is the area seaport. Industrial and commercial facilities are located at the port, and cruise ship use is increasing.

The Cape Canaveral AS road system, which is linked to the regional highway system by the NASA Causeway to the west, State Route 402 to the north, and the Cape Canaveral AS south gate and State Highway A1A to the south, serves launch complexes, support facilities, and industrial areas. An airstrip near the center of the base is used by government aircraft and for delivery of launch vehicles and spacecraft. Cape Canaveral AS is closed to the public.

3.13 UTILITIES

3.13.1 Water Supply

The city of Cocoa provides potable water from the Floridan aquifer to central Brevard County. Maximum daily capacity is 44 million gallons per day (mgd), and the average daily consumption is 25 mgd (CBAEDC, 1992). Cape Canaveral AS receives its water supply from the city of Cocoa and uses an average of 0.64 mgd (Burkett, 1994). To support launches, the water supply distribution system at Cape Canaveral AS was constructed to provide peak capacities of up to 30,000 gallons per minute for 10 minutes.

3.13.2 Wastewater Treatment

Cape Canaveral and its neighboring cities (Cocoa, Cocoa Beach, and Rockledge) are served by separate municipal sewer systems. Unincorporated areas of central Brevard County are served by several treatment plants. Cape Canaveral AS carries out its own sewage disposal with a sewage treatment plant in the industrial area, Trident missile chemical treatment plant, package plants, and numerous septic tanks. A new consolidated wastewater treatment plant for Cape Canaveral AS is currently under construction.

3.13.3 Electricity

Florida Power and Light (FPL) supplies electricity to Brevard County. Cape Canaveral AS is serviced by FPL through a 240/138-kilovolt switching station.

3.14 ORBITAL DEBRIS

Orbital debris consists of material left in Earth orbit from the launch, deployment, and deactivation of spacecraft. Most of the debris mass is incorporated in large objects. The debris population is primarily composed of alumina from solid rocket motor exhaust, aluminum satellite components, and zinc and titanium oxides from thermal coatings (Aerospace, 1995).

The space around the earth in which satellites operate is generally divided into three regimes: Low Earth Orbit (LEO), Medium Earth Orbit (MEO), and Geosynchronous Earth Orbit (GEO). LEO is at altitudes less than 2,000 km with orbital periods less than 3.75 hours. MEO is intermediate between LEO and GEO. GEO is occupied by objects orbiting at an altitude of 35,787 km with an orbital period of approximately twenty-four hours. Geostationary Earth orbit is a further subset of GEO in which an object orbits with an angular rotation speed equal to that of the Earth and is stationary with respect to a point on the Earth's surface (NSC, 1989; USOTA, 1990).

The Air Force Space Command (AFSPC) currently maintains a catalog of more than 7,000 tracked objects in space that are 10 centimeters (cm) and larger: 5,923 in LEO, 683 in MEO, and 453 (including approximately 100 active satellites) in GEO, (NSC, 1989; USOTA, 1990). Only 400 of these tracked objects are operational satellites. These objects are tracked and monitored by the DOD Space Surveillance Network. The National Aeronautics and Space Administration estimates that there are between 35,000 and 150,000 objects in the 1 to 10 cm range, and 3 to 40 million objects under 1 cm in size (AIAA, 1992).

Cataloged orbital debris is normally classified into four categories: inactive payloads, discarded rocket bodies, operational debris (objects such as ejection springs and lens caps), and fragmentation debris. Fragmentation is caused by the explosion of rocket bodies or the collision of objects (rocket bodies, payloads, and/or debris). The location, size, and mass of the orbital debris cloud varies with time, and there are uncertainties with regard to the extent of the problem, particularly with regard to objects less than 10 cm in diameter.

Almost half of the objects orbiting the Earth have come from vehicle fragmentation: propulsion related explosions, intentional explosions (antisatellite tests), and collisions. Historically, the largest uncontrolled addition to orbital debris has been the breakup of upper stages. The dominant cause of these breakups appears to have been pressure-vessel failure through deflagration of hypergolic propellants, stress failure of the vessels, or reduction of pressure-vessel integrity by collision with meteoroids or other space objects (Kessler, 1989).

Orbital debris is a concern for four main reasons (Aerospace, 1995):

- Reentry of debris resulting in earth impact
- Stratospheric ozone depletion during reentry
- Collisions between debris and operational spacecraft
- Operational effects on surveillance, tracking, and communication

The proliferation of objects in space is increasing the risk of collision between debris and operational spacecraft. The effects of impacts between orbiting objects depends on the mass and the relative velocity of the objects. For a collision between a spacecraft and an object less than 0.01 cm, the effect is primarily surface pitting and erosion. For objects between 0.01 and 1.0 cm, structural damage can result, depending on the design of the satellite. Collisions with objects greater than 1.0 cm can be catastrophic.

Astronomers have been affected because of debris. There have been cases of confusion as to whether observed objects were debris or objects of scientific interest. Additionally, the amount of light reflected by debris grows as the population grows, affecting the precision of observations (NSC, 1989).

AFSPC Regulation 57-2 implements the DOD policy of minimizing the impact of space debris on military operations. Under this regulation, “Design and operations of DOD space tests, experiments, and systems will strive to minimize or reduce accumulation of space debris consistent with mission requirements.”

3.15 SAFETY

The primary safety regulation at Cape Canaveral AS is Eastern and Western Range 127-1, Range Safety Requirements. This regulation establishes the framework within which safety issues are addressed, referencing other safety regulations and requiring the preparation of various safety plans. Additional important regulations are Air Force Manual 91-201, “Explosives Safety Standards”; MIL-STD-1522A, “Standard General Requirements for Safe Design and Operation of Pressurized Missile and Space Craft”; MIL-STD-454, Requirement I, “General Requirements for Electronic Devices”; MIL-STD-1576, “Electroexplosive Subsystem Safety Requirements and Test Methods for Space Systems”; Air Force Occupational Safety and Health (AFOSH) Standard 91-XX, Safety

Series; and AFOSH Standard 48-XX, Medical Series.

As indicated in Section 3.1.1, the meteorological environment at Cape Canaveral AS is conducive to numerous lightning strikes. During the summer months, lightning detection systems indicate that 1,400 ± 840 cloud strikes occur per month on the 135-square mile Kennedy Space Center (NASA, 1990).

SECTION 4.0

ENVIRONMENTAL CONSEQUENCES AND CUMULATIVE IMPACTS

4.1 AIR QUALITY

4.1.1 Local Air Quality

4.1.1.1 Processing Emissions

Proposed Action. Potential air pollutant sources associated with processing the DSCS III/IABS satellites will be located at the DPF, the PCF (used to store propellant transfer equipment only).

Emissions are not calculated for facilities indirectly involved with DSCS III/IABS satellite processing, including remote propellant storage locations, antenna sites, and other areas which support the entire installation. Sources at these facilities (i.e., boilers and generators) are considered specific to the individual facilities and would normally generate emissions in the absence of the proposed action. Emissions from these sources are included in the baseline emissions presented in Section 3.

Sources at the DPF will include a boiler, a generator, a 4,000-gallon diesel aboveground storage tank (AST), fuel and oxidizer scrubbers, and the use of materials containing VOCs. The boiler, generator, AST, and majority of the volatile materials are used for facility operation and maintenance to support DSCS III/IABS processing. The oxidizer and fuel scrubbers as well as IPA are used for direct support of the DSCS III/IABS mission.

The boiler, rated at a maximum capacity of 1,050,000 British Thermal Units per hour, is used for climate control in the facility. It is permitted to operate continuously at the rated capacity under FDEP Permit A005-201125.

The generator, rated at 1 Megawatt maximum power, is operated approximately 27 hours per year for standby power service only. This includes 24 hours per year for actual standby use and 3 hours per year for monthly operational tests. Standby generators operating less than 400 hours per year are not required to be permitted by FDEP.

The 4,000-gallon AST is a horizontal, fixed-roof tank that supplies diesel fuel to both the boiler and the generator. The annual fuel throughput for the tank is approximately 31,000 gallons. Roughly 30,330 gallons are supplied to the boiler and 670 gallons are supplied to the generator. The AST is not required to be permitted as an air emissions source.

The fuel and oxidizer scrubbers service the hypergolic vent system at the DPF. Following the loading of anhydrous hydrazine and MMH into the DSCS and IABS respectively, transfer equipment and lines are purged with gaseous nitrogen through the fuel scrubber. The fuel scrubber neutralizes anhydrous hydrazine and MMH vapors in the respective air streams using a 14 percent citric acid solution as the scrubber liquor. The fuel scrubber has a 99 percent conversion efficiency. Following oxidizer loading into the IABS, transfer equipment and lines are purged with gaseous nitrogen through the oxidizer scrubber. The oxidizer scrubber reduces nitrogen tetroxide vapors to nitrogen dioxide using a 25 percent sodium hydroxide solution as the scrubber liquor. The oxidizer scrubber has a reduction efficiency of 94 percent. The fuel and oxidizer scrubbers at the DPF operate under FDEP Permit AO05-236505.

Table 5 Emissions from the Proposed Action

	Pollutant Emissions (tons per year)					
Emissions Source	**NO_x**	**SO_x**	**CO**	**PM10**	**VOC**	**Lead**
Permitted Sources						
Boiler	0.30	0.87	0.08	0.03	0.01	0.00
Fuel scrubber	--	--	--	--	4.28×10^{-8}	--
Oxidizer scrubber	3.41×10^{-7}	--	--	--	--	--
Subtotal	**0.30**	**0.87**	**0.08**	**0.03**	**0.01**	**0.00**
Non-permitted Sources						
Standby generator	0.42	0.06	0.10	0.01	0.01	0.00
AST	--	--	--	--	0.001	--
Materials with VOCs	--	--	--	--	0.42	--
Subtotal	**0.42**	**0.06**	**0.10**	**0.01**	**0.43**	**0.00**
Total emissions	**0.72**	**0.93**	**0.18**	**0.04**	**0.44**	**0.00**
Brevard County Baseline	**9,498**	**32,943**	**960**	**2,366**	**581**	**NR***
Percent Contribution of Permitted Sources	**0.0032**	**0.0026**	**0.0083**	**0.0013**	**0.0017**	**0.00**
Percent Increase of Nonpermitted Sources	**0.0044**	**0.0002**	**0.0104**	**0.0004**	**0.0740**	**0.00**

* NR = not reported.

Materials containing VOCs at the DPF are used almost exclusively for facility maintenance. The exception is IPA, which is used primarily for wipe cleaning of satellite surfaces and other miscellaneous cleaning during satellite processing. Approximately 55 gallons of IPA is used per mission. Other materials used for general facility maintenance include acetone, lacquer thinner, aerosol lacquers, stainless steel coatings, aerosol lubricants, and insect repellant. Quantities of these materials are limited to less than 5 gallons apiece per year. Emissions from the use of these materials are considered to be fugitive emissions (no single point of emissions), and as such, are not required to be permitted. However, contractors as Cape Canaveral AS are required to report VOC emissions to 45 CES/CEV for compliance with the CAA, Title V.

Use of the PCF at SLC-14 for storage of propellant transfer equipment has been previously assessed (USAF, 1988). It was found that no fumes or gases will be emitted as a result of normal storage. Emergency response procedures are in place to contain an accidental spill. Use of the PCF for storage of propellant transfer equipment will be similar to the previous use of the PCF for other programs. No fumes or gases will be emitted as a result of normal storage.

Table 5 summarizes the emissions from sources at the DPF. The boiler and the scrubbers are considered part of the baseline emissions since they are permitted sources and FDEP has received reported emissions from them. Therefore, they will not contribute increases to the baseline inventory of criteria pollutants presented in Section 3. Emissions from the permitted boiler and scrubbers comprise less than 0.0083 percent of the total emissions of each criteria pollutant in Brevard County. Use of the generator, AST, and materials containing VOCs at the DPF will increase the baseline emissions in Brevard County by less than 0.0740 percent per year for each criteria pollutant.

All sources currently operating at the DPF have the appropriate permits or are exempt from permitting. The potential impacts of permitted sources on air quality are evaluated by the FDEP during the permitting process. The permit requirements reflect the results of the FDEP analysis of emission levels that would not adversely affect air quality. Likewise, FDEP conditions for exempting sources from permitting also reflect emission levels that would not adversely affect air quality. As such, emissions from exempt sources are considered by FDEP to have no adverse effect on ambient air quality.

In conclusion, the anticipated air emissions from DSCS III/IABS satellite processing are not expected to violate the NAAQS, the Florida ambient air quality standards, or FDEP air toxics regulations, and would contribute insignificantly to existing air quality in the area. Assumptions regarding minor emission quantities are based on studies performed inventorying air emissions from similar sources at other installations. FDEP indicated that there are no ongoing enforcement actions or compliance problems at the installation (FDEP, 1994).

No Action. Cape Canaveral AS accommodates other space launch programs unrelated to the proposed action that would continue in use for the foreseeable future. The activities associated with these programs have environmental consequences which have been included in the baseline environmental conditions (Section 3). Under the no-action alternative, prelaunch processing operations for other space launch activities would continue to be performed.

4.1.1.2 Clean Air Act Conformity

Since the proposed action will occur in an area that is in attainment for the NAAQS, the general conformity rules, included in 40 CFR Parts 6, 51, and 93, would not apply. Although the Cape Canaveral AS area is in attainment for the NAAQS and not subject to the Clean Air Act conformity requirements, the conformity regulations include "de minimis" amounts below which projects or actions are not expected to adversely affect the status of an area that is nonattainment. The de minimis amounts for moderate nonattainment areas are 100 tons each for nitrogen oxides, sulfur oxides, carbon monoxide, VOC, and particulate matter, and 25 tons for lead. The respective emissions for the proposed action are substantially less than these thresholds. Therefore, even if the Cape Canaveral AS area were in nonattainment, the processing operations for the proposed action would emit de minimis amounts that would not adversely affect air quality.

4.1.2 Stratospheric Ozone

Proposed Action. Since the time scale for mixing in the troposphere is less than the life cycle (decades) of most ODCs, these compounds are usually well mixed in the lower atmosphere. They eventually cycle between the troposphere and stratosphere where the compounds are dissociated by UV radiation in the stratosphere and react with O_3. No Class I ODCs will be used under the proposed action. The only Class II ODCs are related to the air conditioning systems. These ODCs would only be released to the atmosphere if an accident or leak occurred. Therefore, ground facility operations are not anticipated to adversely affect stratospheric ozone.

Deorbiting debris can affect stratospheric ozone through homogeneous and heterogeneous reactions. Recent work evaluating the impacts of homogeneous and heterogeneous reactions on the stratospheric O_3 has been conducted (TRW, 1994).

The evaluation of homogeneous mechanisms involved the study of deorbiting debris entering the stratosphere at hypersonic speed generating gas phase species harmful to O_3. Nitric oxide is produced by the high temperature between the bow shock wave and the body (thermal mechanism) and as pyrolysis products from spacecraft paint or ablation materials (material-bound mechanism). Pyrolysis is the decomposition or transformation of a compound by heat, and ablation is the removal of material from the surface of a body by decomposition or vaporization. For deorbiting debris, it was estimated that one stratospheric O_3 molecule per one billion per day would be

destroyed by the material-bound nitrogen mechanism and one part per ten billion per year by the thermal mechanism (TRW, 1994).

The evaluation of heterogeneous mechanisms addressed the direct orbital decay of large and small particles as well as the stripping of small particles from the surfaces of larger space objects by aerodynamic drag forces during reentry. To determine the depletion of stratospheric O_3, the orbital debris population and debris flux into the stratosphere were estimated. The resultant ozone depletion by heterogeneous mechanisms is estimated to be small: 10,000-100,000 years to destroy one percent of the stratospheric O_3 (TRW, 1994).

No Action. Cape Canaveral AS accommodates other space launch programs unrelated to the proposed action that would continue in use for the foreseeable future. The activities associated with these programs have environmental consequences which have been included in the baseline environmental conditions (Section 3).

4.2 HAZARDOUS MATERIALS

Proposed Action. Hazardous material types and amounts used during DSCS III/IABS processing activities are projected by the satellite contractor based on the four satellites previously processed. Hazardous materials use is limited to activities at the DPF. Facilities indirectly involved with satellite processing, including remote propellant storage locations, antenna sites, and other areas which support the entire installation, will not use hazardous materials to directly support the proposed action. Materials used at these facilities are considered specific to the individual facilities and would normally be used in the absence of the proposed action. As such, they are considered part of the baseline usage at Cape Canaveral AS.

Materials are typically classified as hazardous based on one or more of four major characteristics: toxicity, ignitability, reactivity, and corrosivity. The potential impacts to humans and the environment associated with transporting, storing, and dispensing hazardous materials are primarily a reflection of these characteristics. Toxicity is the tendency of a material to affect the health of a living organism through chemical interaction with the organism's biological systems. Ignitability is the capability of a material to cause fire when exposed to a specific environmental stimulus such as friction, absorption of moisture, or spontaneous chemical changes. Reactivity is a characteristic of certain materials which causes them to readily undergo violent change under a chemical or physical stimulus such as exposure to air, water, a strong heat source, or a strong oxidizer. Corrosivity describes one material's ability to degrade another material, and is typically a characteristic of highly acidic or alkaline materials. Other characteristics of hazardous materials exist, but most apply to special circumstances. For example, cryogens, such as liquid nitrogen, would be considered hazardous due to their extremely low temperature.

All hazardous materials used for satellite processing shall be transported, stored, and dispensed in accordance with Occupational Safety and Health Administration (OSHA) 29 CFR 1926, and AFOSH Standards 91-XX (Safety) and 48-XX (Health), as well as applicable federal, state, and local regulations governing the transport, storage, and use of hazardous materials. These regulations consider the inherent danger of hazardous materials to health, safety, and the environment, and if hazardous materials are handled according to regulations, minimal impacts should occur. In general, aside from minor air emissions associated with solvents, coatings, and adhesives use, no other impacts are expected from the normal use of hazardous materials under the proposed action in accordance with applicable regulations.

The following paragraphs describe the potential impacts associated with hazardous materials used during satellite processing. Materials are grouped and described according to the classification (propellants, solvents, etc.) assigned to each by the satellite contractor. Impacts of hazardous materials on specific environmental media, such as air, and impacts associated with safety issues are presented in more detail in other appropriate subsections of Section 4.

Hazardous materials that will be used during satellite processing are summarized in Table 6. No baseline use of hazardous materials was available for Cape Canaveral AS. As such, potential effects from hazardous materials for the proposed action are analyzed according to their hazard characteristics. Propellants and oxidizers represent the most potentially dangerous group of hazardous materials used during satellite processing and have potential impacts associated with all four hazard characteristics. All three are toxic, highly reactive, ignitable, and corrosive. Anhydrous hydrazine, monomethyl hydrazine, and nitrogen tetroxide will be stored at FSA-1 and delivered to the DPF in approved containers by the JPC when needed. Fuel and oxidizer loading will be conducted separately using methods previously described in Section 2.2.4 using separate propellant transfer equipment for each of the two fuels and the oxidizer. Approximately 600 pounds of anhydrous hydrazine will be loaded into the DSCS satellite. The IABS will receive approximately 1,000 pounds of MMH and 1,600 pounds of nitrogen tetroxide. Hydrazine and nitrogen tetroxide vapor emissions will be controlled by separate packed-column air scrubbers at the DPF. After hydrazine and nitrogen tetroxide transfers take place, empty containers will be returned to FSA-1. During hydrazine and nitrogen tetroxide handling, all applicable safety standards (evacuation of nonessential personnel, use of protective gear) shall be in force to mitigate health and safety hazards, and no impacts are anticipated if these standards are followed during normal fuel and oxidizer processing.

Process liquids used during satellite processing will include a 14 percent citric acid solution, which is used at the DPF as liquor for the hydrazine packed-column air scrubber, and a 25 percent sodium hydroxide solution, which is used as liquor for the oxidizer packed-column air scrubber. Both represent potential hazards associated with toxicity and corrosivity. Citric acid and sodium hydroxide solutions will be contained in the respective air scrubbers and will not be accessible to the environment or to human contact. Trained personnel dispensing the solutions into the scrubbers will take all precautions, including the use of protective wear, to ensure they are not exposed. No impacts are expected during satellite processing from the normal use of process liquids.

Process gases will be used at the DPF during satellite processing for fuel line purging and miscellaneous operations which require pressurized gases. All have potential impacts associated with reactivity and ignitability. Process gases are stored under high pressure and can react violently and explosively when exposed to air through a container puncture or when exposed to an ignition source. To minimize this danger, pressurized gases are contained in thick metal cylinders designed to withstand punctures and prevent exposure to ignition sources. These pressure vessels comply with DOT standards to ensure safety. In addition, the gases will be stored in designated approved storage areas when not in use to further minimize the potential for hazard. Cryogenic liquid nitrogen is considered a potential hazard due to the extreme low temperature at which it is stored and used. Standard health and safety precautions will be taken when using liquid nitrogen to ensure that personnel are not exposed. No impacts are expected from the normal use of process gases and cryogens during satellite processing.

Oils and lubricants will be used at the DPF for facility maintenance during satellite processing. All will be stored in small amounts in approved petroleum, oil, and lubricant (POL) storage lockers. Quantities needed will vary, and supplies will be ordered and maintained as necessary. Oils and lubricants would have potential hazards associated with toxicity if ingested or released to the environment. However, impacts to human health and the environment are unlikely from normal use of these materials if they are dispensed and stored in accordance with applicable health and safety standards.

Protective coatings will be used in relatively small amounts at the DPF for facility mainte

Table 6 Hazardous Materials Associated with DSCS III/IABS Processing

Material	Primary Use	Annual Amount Used (lbs)[a]
Propellants/Oxidizers:		
Anhydrous hydrazine	Mission	1,200
Monomethyl hydrazine	Mission	2,000
Nitrogen tetroxide	Mission	3,200
Process Liquids:		
Citric acid, 14%	Fuel scrubber solution	6,351[b]
Sodium hydroxide, 25%	Fuel scrubber solution	7,989[b]
Process Gases and Cryogens:		
Breathing Air	Mission	44,910
Gaseous argon	Facility maintenance	21
Gaseous helium	Mission	516
Gaseous nitrogen	Mission	123,046
Liquid nitrogen	Mission	2,160
Propane	Mission	43
Oils and Lubricants:		
Bearing grease	Facility maintenance	1
Chevron machine oil	Facility maintenance	37
Dow grease	Facility maintenance	3
Krytox grease	Facility maintenance	18
Krytox oil	Facility maintenance	0.4
Krytox vacuum pump oil	Facility maintenance	16
Mobil oil - heavy medium	Facility maintenance	36
Molykote grease	Facility maintenance	21
Spray lubricant	Facility maintenance	5
Texaco oil	Facility maintenance	5
Protective Coatings:		
Aerosol lacquers	Facility maintenance	12
Circuit board adhesive	Facility maintenance	2
Colloidal silica thickener	Facility maintenance	1
Epoxy hardener	Facility maintenance	10
Epoxy resin	Facility maintenance	10
Insect repellant aerosol	General use	8
Stainless steel coatings	Facility maintenance	52
Solvents and Cleaning Materials:		
Acetone	Facility maintenance	33
Isopropyl alcohol	Mission/facility maintenance	715
Lacquer thinner	Facility maintenance	33

Source: Ulshafer, 1995.

[a] Amounts presented consider two missions per year for those materials with primary use indicated as “mission”.

[b] Amounts of citric acid solution and sodium hydroxide solution shown reflect the amounts present in the scrubbers.

nance. These materials present potential hazards due to their toxicity and ignitability. Typical use of coatings during maintenance will release small amounts of volatile constituents as part of the drying process. All coatings will be used in well-ventilated areas to prevent concentration of hazardous vapors. Additionally, necessary safety precautions will be taken to prevent the ignition of vapors. When not in use, coatings will be stored in approved flammable materials storage lockers. Supplies will be ordered and maintained as necessary. With the exception of minor air emissions, no other impacts are anticipated from the normal use of protective coatings and resins during satellite processing.

Solvents and cleaning materials will be used at the DPF for miscellaneous wipe cleaning and thinning of coatings. All are volatile and can be expected to release small amounts of vapors in the immediate area where they are used. Solvents and cleaning materials will be used in well-ventilated areas to prevent buildup of vapors, and precautions will be taken to prevent ignition of vapors. With the exception of isopropyl alcohol, all solvents and cleaning materials will be stored in small quantities in approved flammable materials storage lockers. Isopropyl alcohol, used primarily for wipe cleaning of surfaces on the satellite, will be stored in a single 55-gallon container located in an isolated storage room in the DPF. This room is equipped with its own fire suppression system. Supplies will be ordered and maintained as needed. With the exception of non-adverse impacts to air quality, normal use of solvents during satellite processing is not expected to present other effects.

Several of these compounds or their constituents are targeted chemicals on the Environmental Protection Agency 17 (EPA-17) priority pollutant list of industrial toxics. This list was developed to identify chemicals used throughout industry that are judged to be of the greatest concern due to their toxicity and effect on the environment. Air Force Materiel Command Regulation 500-13, which incorporates the Air Force action memorandum regarding pollution prevention, dated January 7, 1993, commits the Air Force to reducing purchases of EPA-17 industrial toxics in 1996 by 50 percent from the 1992 baseline. Additionally, the EPA has established a voluntary reduction program, called the 33/50 program, which aims to promote voluntary reduction of EPA-17 priority pollutants by 50 percent in 1995 with an interim goal of 33 percent by 1992. EPA-17 chemicals used during satellite processing include toluene and xylene, which are typical constituents of lacquer thinner and coatings. These chemicals will be used only in small quantities at the DPF for miscellaneous thinning and coating.

Explosive ordnance used on the satellite will present potential safety risks associated with accidental explosions. Safety hazards from accidental explosions are described in section 4.15.

The contractor for DSCS III/IABS will participate in the hazardous materials pharmacy being implemented at Cape Canaveral AS. Hazardous material spill prevention and control for satellite processing activities shall be in accordance with 45th Space Wing Operations Plan 19-1.

No Action. Cape Canaveral AS accommodates other space launch programs unrelated to the proposed action that would continue in use for the foreseeable future. The activities associated with these programs have environmental consequences which have been included in the baseline environmental conditions (Section 3). Under the no-action alternative, prelaunch processing operations for other space launch activities would continue to be performed.

4.3 HAZARDOUS WASTE

Proposed Action. Hazardous materials associated with DSCS III/IABS processing can potentially generate hazardous waste. The contractor for the satellite is responsible for identification, containerization, labeling, and accumulation of hazardous wastes in accordance with all applicable federal, state, and local regulations, and with 45 SW OPlan 19-14. All hazardous wastes generated from satellite processing activities will be transported, treated,

stored, and disposed (or arrangements made for disposal) by the JPC.

A forecast of annual hazardous waste streams associated with the proposed action is presented in Table 7. Hazardous waste predictions for satellite activities assume two missions per year.

Liquid wastes will be generated almost exclusively from fuel and oxidizer transfer operations using separate propellant transfer equipment for each of the two fuels and the oxidizer. After loading anhydrous hydrazine into the DSCS satellite, transfer equipment and lines will be flushed first with potable water and then with an IPA and demineralized water mixture. Equipment and lines used to transfer MMH to the IABS will also undergo potable water and IPA/demineralized water flushes after MMH has been loaded. Potable water will be used to flush oxidizer transfer equipment and lines after nitrogen tetroxide has been transferred to the IABS. The first three rinses of potable water for MMH and nitrogen tetroxide lines and equipment are considered hazardous waste. Further rinses with IPA and demineralized water may or may not be hazardous waste depending on the waste characterization. Approximately 5 gallons of sodium hydroxide solution used for soaking small oxidizer transfer equipment parts (seals, fittings, etc.) will be added to the oxidizer rinse water. All five rinse streams will be collected in separate, approved DOT 5C 55-gallon containers. The containers will accumulate in the waste propellant area (satellite accumulation points) outside the DPF until retrieved by the JPC.

The fuel and oxidizer rinsate wastes may or may not be hazardous depending on how the waste was generated and/or the characteristics of the wastes. Waste from each drum will be sampled and characterized based on laboratory analysis and the generation process. Based on the results of the waste characterization, drums will be labeled as hazardous or non-hazardous and disposed of accordingly by the JPC. Nonhazardous fuel rinsate can be disposed of in the Hypergolic Propellants Incinerator operated by the JPC under air permits obtained from FDEP. Nonhazardous oxidizer wastes can be neutralized and discharged to the sanitary sewer in accordance with a variance for disposal of liquid oxidizer wastes.

Sodium hydroxide solution used in the oxidizer scrubber will be changed approximately once every five to ten years. As requested, the JPC will pump the spent scrubber solution into approved containers, and label and dispose the waste accordingly after testing to determine the waste characterization of the liquid. The citric acid solution used in the fuel scrubber will be collected and disposed by the JPC as non-hazardous waste. Fresh scrubber solutions will be provided by the JPC.

During gaseous nitrogen purging of equipment and lines used to transfer anhydrous hydrazine and MMH to the DSCS satellite and the IABS, respectively, liquid droplets remaining in the equipment will be collected by a liquid separator as the air streams pass through the hypergolic vent scrubber system. Prior to loading the IABS with nitrogen tetroxide, this mixture of anhydrous hydrazine and MMH (approximately 5 gallons) will be transferred from the liquid separator to an approved 5-gallon container and collected by the JPC. The JPC will arrange for the reclamation of the two fuels for future use.

Solid hazardous wastes will also be generated exclusively from fuel and oxidizer transfer operations. Pads, wipes, and other solids will be used to clean drips of anhydrous hydrazine, MMH, and nitrogen tetroxide. Solids coming into contact with a fuel or oxidizer will be double-bagged and placed in an approved DOT 21C 14-gallon container. A separate container will be used for each fuel or oxidizer. Containers will be labeled as hazardous waste and accumulated in the waste fuel and oxidizer areas outside the DPF until collected by the JPC (Ulshafer, 1995). Because solids contaminated with MMH and nitrogen tetroxide are acutely toxic hazardous waste, these containers will be moved from the DPF to a 90-day waste accumulation facility within 72 hours in accordance with 45 SW OPlan 19-14 if amounts exceed one quart.

Table 7 Forecast of Annual Hazardous Wastes Associated with DSCS III/IABS

Waste Description	Estimated Volume of Waste (lb/yr)[a]
Liquid Hazardous Wastes	
Potable water rinsate of anhydrous hydrazine transfer equipment	917
IPA and demineralized water rinsate of anhydrous hydrazine transfer equipment	917
Potable water rinsate of MMH transfer equipment	917
IPA and demineralized water rinsate of MMH transfer equipment	917
Potable water rinsate of nitrogen tetroxide transfer equipment	917
Sodium hydroxide (oxidizer scrubber solution)	6,251[b]
Anhydrous hydrazine and MMH mixture collected from liquid separator on scrubber	110[c]
Solid Hazardous Wastes	
Pads, wipes, and other solids contacting anhydrous hydrazine	56
Pads, wipes, and other solids contacting MMH	56
Pads, wipes, and other solids contacting nitrogen tetroxide	56
Total Exclusive of Scrubber Solution and Reclaimed Propellant	4,753
Baseline Cape Canaveral AS	420,662
Percent of Baseline from Proposed Action	1.1

Source: Ulshafer, 1995.

[a] Amounts presented account for two missions per year .

[b] Sodium hydroxide scrubber solution will actually be changed approximately once every 5-10 years. The amount presented reflects the total amount that will be wasted when the solution is changed. This amount is not included in the annual hazardous waste total used for comparison with the baseline hazardous waste generated annually at Cape Canaveral AS.

[c] The anhydrous hydrazine and MMH is reclaimed and not included in the annual hazardous waste total used for comparison with the baseline hazardous waste generated annually at Cape Canaveral AS.

DSCS III/IABS satellite processing will generate up to an estimated total of 4,753 pounds of hazardous waste per year. This is approximately 1.1 percent of the current hazardous waste generation rate of 420,662 pounds per year at Cape Canaveral AS. The annual hazardous waste generation rate for Cape Canaveral AS includes hazardous wastes from prior DSCS III/IABS missions. As such, processing of future missions is not expected to increase hazardous waste generation from its current level.

No Action. Cape Canaveral AS accommodates other space launch programs unrelated to the proposed action that would continue in use for the foreseeable future. The activities associated with these programs have environmental consequences which have been included in the baseline environmental conditions (Section 3). Under the no-action alternative, prelaunch processing operations for other space launch activities would continue to be performed.

4.4 SOLID WASTE

Proposed Action. Solid waste will be generated by DSCS III/IABS processing activities as well as by personnel associated with those activities. Drums and dumpsters are used for temporary storage of solid waste. Containers

are removed or emptied by the Cape Canaveral AS solid waste contractor. The satellite contractor plans to participate in the white paper and aluminum can recycling program in place at Cape Canaveral AS. Participation in this program will reduce the total solid waste that would have been generated by each contractor.

Assuming a maximum of 67 permanent and transient DSCS III/IABS personnel (discussed in Section 4.12), a design solid waste generation rate of 3 pounds per person per day, and 260 working days per year, satellite personnel would generate up to an estimated 26 tons of solid waste per year (tpy). In addition, satellite processing activities would generate less than 0.5 tons of non-hazardous solid waste per year for a total solid waste generation rate of approximately 26.5 tpy. This represents an increase of 0.76 percent over the current solid waste generation rate of 3,492 tpy for Cape Canaveral AS.

No Action. Cape Canaveral AS accommodates other space launch programs unrelated to the proposed action that would continue in use for the foreseeable future. The activities associated with these programs have environmental consequences which have been included in the baseline environmental conditions (Section 3). Under the no-action alternative, prelaunch processing operations for other space launch activities would continue to be performed.

4.5 POLLUTION PREVENTION

Proposed Action. No Class I ODCs are used in the satellite processing facilities. The air-conditioning systems use Freon-22 refrigerant, a Class II ODC considered to be much less harmful than other Class I refrigerants due to its lower ozone-depleting potential. Small quantities of materials that contain EPA-17 targeted industrial toxics will be used during satellite processing. These include coatings and thinners which typically contain toluene and xylene. The satellite contractor has discontinued the use of freon, methyl chloroform, methyl ethyl ketone, and radioactive krypton during processing operations.

Toluene and xylene are also listed chemicals under EPCRA section 313. Although toluene and xylene amounts for the proposed action do not exceed the usage threshold of 10,000 pounds, each will contribute to the total amounts of toluene and xylene used at the entire facility. If toluene or xylene usage at Cape Canaveral AS as a whole exceeds the reporting threshold, release pathways for each chemical in exceedance will have to be documented in the toxic release inventory Form R reports submitted to the EPA. Therefore, contractors at Cape Canaveral AS must track all EPCRA-listed chemicals and report emissions to 45 CES/CEV. A separate Form R report is required for each exceeding chemical. Since toluene and xylene are found exclusively in thinners and coatings at the DPF, the entire quantity of each will be released to the air during usage of the materials.

The DSCS III/IABS program will comply with the PPMAP that will be developed by Cape Canaveral AS. Compliance with the PPMAP will minimize pollution and meet the regulatory requirements relative to pollution prevention.

No Action. Cape Canaveral AS accommodates other space launch programs unrelated to the proposed action that would continue in use for the foreseeable future. The activities associated with these programs have environmental consequences which have been included in the baseline environmental conditions (Section 3). Under the no-action alternative, prelaunch processing operations for other space launch activities would continue to be performed.

4.6 NONIONIZING RADIATION

Proposed Action. Table 8 summarizes the transmitting characteristics for the antennas associated with the proposed action. There are 5 types of transmitting antennas on the DSCS III/IABS satellite system. Two earth coverage (EC) horns, two multi-beam antennas (MBA), and one gimbaled parabolic reflector antenna on the DSCS satellite will transmit communications data and information on X-band frequencies to ground-based receivers. A UHF, cross dipole antenna on the DSCS satellite will

Table 8 Summary of Transmitting Antenna Characteristics

Antenna Type/Size	Quantity	Band	Operating Frequency (MHz)	Peak Power to Transmitter (W)	Antenna Gain (dB)
DSCS III Satellite[1]					
S-band Cross Dipole	1	S	2,257.50 - 2277.5	2	5.0
UHF Cross Dipole	1	UHF	240.00 - 255.00	150	7.0
EC horns	2	X	7405.00 - 7750.00	10	20.0
Multi-band antenna	2	X	7250.00 - 7590.00	40	30.0
Gimbaled parabolic dish	1	X	7250.00 - 7590.00	40	33.0
IABS[1]					
S-band Cross Dipole	1	S	2,257.50 - 2277.5	2	5.0
DSCS Processing Facility[2]					
Parabolic Dish/8-ft	1	S	1,815.74	0.00032	32.0
Satellite Assembly Building[3]					
EVCF Parabolic Dish/8-ft	1	S	1750.00	13	29.5
EVCF Parabolic Dish/4-ft	1	S	1750.00	13	21.0

1 MMAS, 1994b.
2 Fragala, 1993.
3 FA, 1991.

provide communications capability with airborne receivers. An S-band cross dipole antenna on both the DSCS satellite and the IABS will transmit telemetry, tracking, and command information to ground-based receivers.

The 8-foot antenna on the DPF, the 8-foot and 4-foot EVCF antennas on the SAB, and the 23-foot antenna on the TVCF will be used to test various satellite functions during prelaunch processing. The TVCF will be used in conjunction with the EVCF to test the satellite network links with ground control facilities. The TVCF antenna has been previously assessed and determined to have no significant radio frequency radiation impacts, including additive impacts with the EVCF antennas (USAF, 1993). Analysis of the TVCF is not included in this EA.

The RF radiation hazard analysis for the antennas is based on AFOSH Standard 48-9, which establishes maximum PELs of RF radiation for Air Force and contract workers in restricted areas and for the general public in nonrestricted areas. All PEL standards presented in AFOSH Standard 48-9 are the result of extensive RF radiation research and testing. Maximum PEL standards, expressed as power densities in mW/cm^2, are used along with the peak antenna power and the antenna gain to calculate a “safe distance” from each antenna beyond which no hazard to humans will occur.

AFOSH Standard 48-9 recommends a maximum PEL of 10 mW/cm^2 for personnel in restricted areas where the antenna operating frequency is greater than 1,000 megahertz (MHz). For restricted areas where frequencies are less than 1,000 MHz, the maximum PEL recommended is a function that varies with the actual antenna frequency. A PEL of 5 mW/cm^2 is recommended for the general public in unrestricted areas where the antenna frequency is greater than 1,500 MHz. For unrestricted areas where frequencies are below 1,500 MHz, a frequency-dependent function similar to the one for restricted areas is used.

Table 9 presents a summary of unrestricted (conservative) safe distances for each antenna on the DSCS III/IABS satellite and associated ground facilities, as calculated using methods recommended in AFOSH Standard 48-9.

Table 9 Summary of RF PEL Safe Distances

Location	Antenna	Unrestricted Safe Distance (ft)
DSCS III Satellite	S-band Cross Dipole	<1
DSCS III Satellite	UHF Cross Dipole	8.7
DSCS III Satellite	EC horns	4.1
DSCS III Satellite	Multi-band	26.2
DSCS III Satellite	Gimbaled Parabolic	37.0
IABS	S-band Cross Dipole	<1
DSCS Processing Facility	8-ft Parabolic	<1
Satellite Assembly Building	EVCF 8-ft Parabolic	15
Satellite Assembly Building	EVCF 4-ft Parabolic	6

The limiting RF radiation safe distance for antennas on the DSCS III/IABS satellite is 37 feet for the gimbaled parabolic antenna. The antennas on the DSCS III/IABS satellite will be enclosed in RF antenna hats during system testing. The RF antenna hats will reduce all hazardous distances to less than six feet (MMAS, 1994b). Processing personnel will remain outside the six-foot hazard distance during testing of the antennas. No RF radiation hazard will be associated with the antenna mounted to the roof of the DPF because the PEL distance is less than 1 foot. The area within the 1-foot safe distance is in open space and not accessible to personnel. This small PEL distance is due to a maximum power output from the transmitter of less than 1 mW.

Likewise, no RF radiation hazard will be associated with either EVCF antenna on the roof of the SAB. The areas within the 15-foot and 6-foot PEL distances are in open space and not accessible to personnel.

Birds in the beam of a transmitting antenna would be subjected to RF radiation. The AFOSH standards are based on experimental animal studies that determined maximum values of the Specific Absorption Rate (SAR) at which animals were not harmed. The SAR is the rate at which RF energy is absorbed by an animal and is expressed in watts per kilogram (W/kg). The AFOSH standards included a safety factor of ten and are based on a SAR of 0.4 W/kg averaged over a six-minute period.

Based on conservative assumptions regarding bird weight, cross-sectional area, flight speed, and beam width, a flying bird would not be harmed by RF radiation as it crossed the beam of a transmitting antenna. A bird that roosted in the beam of an antenna would experience discomfort from RF radiation-induced heat and move from the beam area (Polk & Postow, 1986).

All activities generating nonionizing radiation shall be coordinated with the base radiation office (45 ADMS/SGPH) and base safety (45 SW/SG) for compliance with Air Force, DOD, and federal regulations regarding radiation protection.

No Action. Cape Canaveral AS accommodates other space launch programs unrelated to the proposed action that would continue in use for the foreseeable future. The activities associated with these programs have environmental consequences which have been included in the baseline environmental conditions (Section 3). Under the no-action alternative, prelaunch processing operations for other space launch activities would continue to be performed.

4.7 IONIZING RADIATION

Proposed Action. Two panels on the satellite are manufactured of thoriated magnesium. The thorium activity in each satellite is approximately 82 microcuries. This level does not constitute a hazard unless the material is absorbed into the body. Prelaunch processing operations do not include any processes such as filing or drilling that would disturb the panels and cause a release of particles that

could be absorbed in the body. The Director of Nuclear Safety for the Air Force has authorized the launch of this material in a memorandum dated February 4, 1991 (MMAS, 1994b).

All activities generating ionizing radiation must be coordinated with the base radiation office (45 ADMS/SGPH) and base safety (45 SW/SG) for compliance with Air Force, DOD, and federal regulations regarding radiation protection.

No Action. Cape Canaveral AS accommodates other space launch programs unrelated to the proposed action that would continue in use for the foreseeable future. The activities associated with these programs have environmental consequences which have been included in the baseline environmental conditions (Section 3). Under the no-action alternative, the use of thoriated magnesium panels with insertion of this low-level radioactive source into orbit would not occur.

4.8 WATER QUALITY

Proposed Action. DSCS III/IABS satellite processing activities will take place within structures and precautions will be taken to prevent and control spills of hazardous materials in accordance with 45 SW OPlan 19-1. Spills of spacecraft fuels and oxidizers will be controlled through sump systems in the West and East bays of the DPF. The floor in each bay is sloped toward a drainage area in the corner of the room which contains one drain for fuels and another for oxidizers. The fuel drain in each bay is connected to a 2,500-gallon aboveground holding tank located in the waste propellant area of the DPF through an underground piping system. Likewise, the oxidizer drain in each bay is connected to 1,500-gallon aboveground holding tank in the waste propellant area. During fuel or oxidizer loading activities (conducted separately), the appropriate drain will be opened to catch potential spills. The sump systems are tested regularly prior to fuel and oxidizer loading operations to ensure system integrity.

The floor drains and associated tanks are for emergency purposes only (large spills) and are not routinely used. Therefore, these systems are not regulated as hazardous waste tank systems.

The 4,000-gallon AST used to supply diesel fuel to the boiler and standby generator has secondary containment sufficient to hold 5,100 gallons. The AST has underground fuel lines with pressure monitors to detect leaks.

Since no new facilities will be constructed under the proposed action, storm water permits from the Saint Johns River Water Management District are not required. The existing facilities are covered under the current Cape Canaveral AS storm water pollution prevention plan.

No Action. Cape Canaveral AS accommodates other space launch programs unrelated to the proposed action that would continue in use for the foreseeable future. The activities associated with these programs have environmental consequences which have been included in the baseline environmental conditions (Section 3). Under the no-action alternative, prelaunch processing operations for other space launch activities would continue to be performed.

4.9 BIOLOGICAL COMMUNITIES

Proposed Action. Prelaunch processing of the DSCS III/IABS will occur in existing facilities that are currently used for these processes. Adjacent habitats will not be disturbed.

Although potential effects of lighting associated with facilities at Cape Canaveral AS is a concern for endangered sea turtles, a lighting policy for management of exterior lights and emphasis on the use of low-pressure sodium lights has been implemented. Lights which emit ultraviolet, violet-blue, and blue-green wavelengths disorient sea turtle hatchlings on the beach. The disoriented hatchlings move inland rather than seaward and suffer increased mortality. Exterior lighting at all facilities used for satellite processing shall conform with this policy.

The proposed action will utilize existing facilities. There will be no modifications to these

facilities, disturbances to adjacent grounds, or changes in existing activities. Biological activity, habitats, or species of concern at Cape Canaveral AS will not be affected beyond existing baseline conditions. Therefore, consultation with the US Fish and Wildlife Service under Section 7 of the Endangered Species Act would not be required.

No Action. Cape Canaveral AS accommodates other space launch programs unrelated to the proposed action that would continue in use for the foreseeable future. The activities associated with these programs have environmental consequences which have been included in the baseline environmental conditions (Section 3). Under the no-action alternative, launches would continue to occur for other programs.

4.10 CULTURAL RESOURCES

Proposed Action. Although activities related to prelaunch satellite processing occur at two SLCs that are listed or eligible for the National Register of Historic Places, the integrity of these resources would not be affected by satellite processing. No construction or renovation of processing facilities will be conducted for the proposed action. Since no earth disturbance will occur, archaeological resources will not be affected.

No Action. Cape Canaveral AS accommodates other space launch programs unrelated to the proposed action that would continue in use for the foreseeable future. The activities associated with these programs have environmental consequences which have been included in the baseline environmental conditions (Section 3). There would be no difference between the proposed action and the no-action alternative because satellite processing facilities would likely be utilized by other programs.

4.11 NOISE

Proposed Action. Noise sources in prelaunch processing areas, such as pumps and compressors, are minor compared to launch noises. Operational activities will be conducted inside buildings. These activities are typical for an industrial facility and similar activities occur at different locations on Cape Canaveral AS. All necessary and feasible noise control mitigation measures will be implemented at the affected facilities to meet worker noise exposure limits as specified by OSHA. Due to the distances involved, there will be no noise impact at sensitive receptor locations in public residential areas as a result of the normal prelaunch processing operations. Launch noise is addressed in the EA for Medium Launch Vehicle II (USAF, 1989).

No Action. Cape Canaveral AS accommodates other space launch programs unrelated to the proposed action that would continue in use for the foreseeable future. The activities associated with these programs have environmental consequences which have been included in the baseline environmental conditions (Section 3). Under the no-action alternative, no noise due to prelaunch processing for the DSCS III/IABS would occur.

4.12 SOCIOECONOMICS

Proposed Action. Seventeen personnel are permanently stationed at Cape Canaveral AS in support of the DSCS program, seven of whom are military. Most of these personnel support other programs besides DSCS. For each launch, approximately 30 to 50 additional personnel are brought in as needed to support prelaunch processing operations. Therefore, a maximum of 67 personnel would be involved.

The 17 permanent personnel represent approximately 0.23 percent of the 7,500-person work force at Cape Canaveral AS. The combined total of 67 is approximately 0.89 percent.

Assuming 2.8 dependents per permanent employee, the estimated population of Brevard County for 1995 would be increased by 65. For the period 1990 through 1995, the population of Brevard County was estimated to increase by 13.5 percent, to 452,737 (University of Florida, 1992).

No Action. Cape Canaveral AS accommodates other space launch programs unrelated to the proposed action that would continue in

use for the foreseeable future. The activities associated with these programs have environmental consequences which have been included in the baseline environmental conditions (Section 3). Assuming half of the DSCS program permanent personnel would be unneeded, the work force at Cape Canaveral AS decrease by 9, or 0.12 percent. The Brevard County population would decrease by 46.

4.13 UTILITIES

4.13.1 Water Supply

Proposed Action. Assuming a design water use of 50 gallons per day (gpd) per person, the 17 permanent personnel would consume approximately 850 gpd, or approximately 0.13 percent of the average daily water usage at Cape Canaveral AS of 640,000 gpd. For 67 permanent and interim personnel associated with a launch, water consumption would total 3,350 gpd, or 0.52 percent of the average daily use at Cape Canaveral AS.

No Action. Cape Canaveral AS accommodates other space launch programs unrelated to the proposed action that would continue in use for the foreseeable future. The activities associated with these programs have environmental consequences which have been included in the baseline environmental conditions (Section 3). Assuming half of the DSCS program permanent personnel would be unneeded, the average daily water consumption at Cape Canaveral AS would decline from 640,000 gpd to 639,550 gpd.

4.13.2 Wastewater Treatment

Proposed Action. No wastewater will be generated from prelaunch satellite processing aside from that generated by personnel. Effluent from the DPF is discharged to a 0.010 mgd extended aeration treatment plant (Facility Number 55860), and thence to two percolation ponds for disposal to the surface groundwater aquifer. FDEP Permit D005-195237 authorizes the discharge of 0.010 mgd of effluent treated to a secondary level. The plant currently operates at approximately 25 percent of its capacity. Other satellite processing facilities utilize individual septic systems to treat wastewater or discharge into the wastewater treatment plant for the main industrial area.

Assuming a design wastewater flow of 30 gpd per person and 17 permanent personnel associated with the DSCS program, the total estimated wastewater flow would be 0.0005 mgd. For 67 permanent and interim personnel associated with a launch, wastewater flow would total 0.002 mgd.

No Action. Cape Canaveral AS accommodates other space launch programs unrelated to the proposed action that would continue in use for the foreseeable future. The activities associated with these programs have environmental consequences which have been included in the baseline environmental conditions (Section 3). Assuming half of the DSCS program permanent personnel would be unneeded, the average daily wastewater flow at Cape Canaveral AS would decrease by 0.0003 mgd.

4.13.3 Electricity

Proposed Action. The main use of electricity in support of prelaunch processing activities is related to environmental control at facilities, and is not specifically related to the number of personnel. These facilities are all existing, and the proposed action would cause essentially no change in electricity usage.

No Action. Cape Canaveral AS accommodates other space launch programs unrelated to the proposed action that would continue in use for the foreseeable future. The activities associated with these programs have environmental consequences which have been included in the baseline environmental conditions (Section 3). Prelaunch processing facilities would continue in use for other programs, and there would be essentially no change in electricity usage.

4.14 ORBITAL DEBRIS

Proposed Action. A total of six DSCS III satellites will be launched into GEO. The launch weight of the DSCS III satellite is 2,643 pounds, which includes 608 pounds of mono-

propellant hydrazine and 45 pounds of ballast. After the completion of its mission, the remaining mass would be 2,035 pounds. The launch weight of the IABS is approximately 3,268 pounds, including the launch vehicle adapter and 2,670 pounds of propellant that will be consumed. At the conclusion of its mission, the IABS mass would be 597 pounds.

The six IABS will end in an orbit approximately 280 km below GEO, and not interfere with on-orbit satellites in GEO. However, satellites launching into GEO will traverse the orbit used by the IABS. The six DSCS III satellites will be boosted to a disposal orbit beyond GEO and not interfere with on-orbit satellites in GEO.

Therefore, the number of objects in near GEO will increase by 12, or approximately 2.6 percent. The mass will increase by 15,792 pounds. The equatorial radius of the earth is approximately 6,392 km and the altitude to GEO is approximately 35,787 km. Therefore, the area of the sphere occupied by GEO is approximately 22,356,428,351 square kilometers (km^2), and the area in km^2 per object would be 48,078,341. However, most of the objects in GEO are near the equatorial band where the DSCS III satellites will operate and not evenly distributed.

GEO is an important resource, and the chance of a collision between a large satellite and debris is estimated at 0.1 percent over its lifetime (USOTA, 1990). Additionally, the relative velocities in GEO are low, and collisions would not be as damaging and produce as many fragments as a collision in LEO, where substantial concerns are present. Recent analysis suggests that satellites in low to medium Earth orbits may require design changes by 2000 to protect them against orbital debris (Aerospace, 1995). The hazards from orbital debris in GEO are considered less than the hazard from meteoroids passing through the orbit (USOTA, 1990). However, collisions in GEO could increase the number of objects and thus the chance of collisions.

Measures to prevent and reduce space debris include:

- Expulsion of excess propellants and pressurants after mission completion
- Designing satellites so that they are "litter-free" - i.e., separation devices, payload shrouds, and other expendable hardware are disposed of at altitudes where they do not become orbital or remain attached by lanyards
- Providing electrical protection circuits to prevent battery explosions
- Deorbiting used satellites and launch vehicles
- Boosting satellites into disposal orbits after operational life ends
- Boosting satellites to escape velocity
- Adding dedicated debris shielding
- Placing mission critical and potentially explosive components inside satellites
- Using materials that do not degrade into fragments
- Selecting launch windows using collision avoidance software programs

Sufficient fuel shall be reserved to move each satellite to a disposal orbit. For the near-term, these measures will minimize the potential for collision with operational spacecraft. For the long-term, the proposed action will contribute to a problem which may eventually become significant.

The environmental effects of deorbiting debris are assessed in the sections of the EA regarding safety and stratospheric ozone.

No Action. Other space programs unrelated to the proposed action would continue for the foreseeable future. The activities associated with these programs have environmental consequences which have been included in the baseline environmental conditions (Section 3). Under the no-action alternative, debris related to these other programs, both United States and foreign, will continue to be deposited in orbit.

4.15 SAFETY

Proposed Action. In addition to the general safety regulations and standards enumerated in Section 3.15, satellite processing safety has been considered in the Accident Risk Assessment Report for the DSCS III/IABS (MMAS, 1994b) and the pad safety plan for the DPF. Safety concerns regarding satellite processing operations can generally be divided into injury to personnel and damage to property.

4.15.1 Injury to Personnel

Safety concerns include:

- Transport aircraft accidents
- Transport vehicle accidents during delivery of components
- Vehicle accidents during transport between facilities at Cape Canaveral AS
- Accidents during handling operations related to failure of support equipment or personnel errors
- Personnel contact with electrically charged components
- Exposure of personnel to hazardous levels of radio frequency radiation
- Execution of hazardous systems functions with personnel in unsafe location
- Execution of hazardous systems functions in incorrect sequence
- Failure of hazardous systems monitoring equipment
- Rupture of a pressurized component
- Personnel contact with heat sources including load resisters, infrared light sources, and high intensity lights
- Battery rupture and/or explosion
- Activation of ordnance devices by accident or electrostatic discharge
- Rupture of hydrazine or MMH tanks or lines resulting in exposure to poisonous vapor or liquid, or explosion due to ignition or exposure to incompatible materials
- Rupture of nitrogen tetroxide tanks or lines resulting in exposure to poisonous and reactive vapor or liquid
- Unauthorized personnel in processing areas
- Orbital reentry
- Tripping
- Sharp edges
- Noise.

4.15.2 Damage to Property

Safety concerns include:

- Transport aircraft accidents
- Transport vehicle accidents during delivery of components
- Vehicle accidents during transport between facilities at Cape Canaveral AS
- Excessive stress loads during transport or handling
- Accidents during handling operations related to failure of support equipment or personnel errors
- Inadvertent deployment of satellite mechanisms within launch vehicle fairing
- Execution of system functions with safeguards not set
- Execution of system functions in incorrect sequence
- Battery rupture and/or explosion
- Improper equipment installation or cable connection
- Failure of monitoring equipment
- Contamination of the propellant systems by entry of particulate-contaminated gas
- Rupture of a pressurized component
- Electrostatic discharge
- Damage to solar array panels during testing
- Transmission of improper or out-of-sequence signals

- Malfunction of batteries
- Activation of ordnance devices by accident or electrostatic discharge
- Power surges
- Backup power and control failure
- Short circuiting from improper electrical connections
- Improper installation in transporters
- Failure of environmental control during storage or transport
- Rupture of hydrazine or MMH tanks or lines resulting in explosion due to ignition or exposure to incompatible materials
- Rupture of nitrogen tetroxide tanks or lines resulting in oxidation of exposed vulnerable materials
- Insertion in improper orbit
- Damage to antennas during testing and assembly
- Premature reentry.

4.15.3 Risk Assessment and Mitigation

Proposed Action. Mishaps during air transport of the satellite are unlikely since flight crews are constantly trained in operation and safety of the aircraft. Ground transport accidents are also unlikely because of the low speeds, precautions, and times when transport occurs. The DSCS III/IABS is transported to the DPF without propellants.

The safety concerns listed in previous sections have been considered in planning for prelaunch processing and launch. Detailed procedures and training for all hazardous processes have been prepared and implemented. The 45th Space Wing Director of Safety will review and approve all safety procedures.

Orbital reentry of the IABS or satellites is unlikely to occur for substantially more than 1,000 years due to the nature of their final orbits, unless an accident occurs during orbital insertion. Therefore, the following discussion is only applicable to an accident resulting in reentry.

Two primary factors determine whether or not an object will survive reentry and strike the Earth: the melting point of its material and its ballistic coefficient. The ballistic coefficient is the mass of an object compared to its area. As an object reenters, friction with the atmosphere produces heat. Heating begins at approximately 80 nautical miles and the heating rate peaks at 30 to 45 nautical miles, depending on the ballistic coefficient of the object. The integrity of an object is maintained until its melting temperature is reached, and the ballistic coefficient of the object determines the maximum temperature that will be reached during reentry (Aerospace, 1992).

Space and launch vehicles with an aluminum structure typically breakup at 42 nautical miles. The subsidiary objects resulting from this breakup will then be exposed to atmospheric drag, and their fate will vary depending on their material and ballistic coefficient. Aluminum objects with a ballistic coefficient of less than 15 pounds per square feet (lb/ft^2) will generally survive. Propellant and pressurant tanks made from titanium will generally survive reentry intact, regardless of ballistic coefficient, because of titanium's high melting temperature (Aerospace, 1992).

Therefore, certain components of the satellite and IABS are likely to survive reentry. For those objects with a high ballistic coefficient that survive reentry, the results of a person being struck, whether in a building or not, would probably be fatal. Those objects with a lower ballistic coefficient that survive reentry will have a lower velocity at impact, but still could produce injury or death. To date there have been no injuries or fatalities from reentering objects. Over the period 1958 to 1991, NASA indicated that 14,831 payloads and debris objects reentered the atmosphere (NASA, 1991). The daily average individual risk from reentering objects computed by the Aerospace Corporation is substantially smaller than such hazards as work accidents, lightning, air carrier accidents, or smallpox vaccinations, and is comparable to that of being struck by a meteorite (meteor that survives to Earth impact). The only reported incident of a meteorite striking a person occurred in 1954 when a woman was bruised by a stone

meteorite that crashed through the roof of her house (Aerospace, 1992). Assuming an increase in the number of reentering objects would increase the risk on a proportional basis, a 100-fold increase in objects with a consequent 100-fold increase in risk would produce a daily average individual risk still substantially less than any of the hazards mentioned previously.

Additional precautions are taken to ensure that the risk from lightning strikes is reduced. All facilities at Cape Canaveral AS incorporate lightning arresting devices for protection against lightning strikes.

No Action. Cape Canaveral AS accommodates other space launch programs unrelated to the proposed action that would continue in use for the foreseeable future. The activities associated with these programs have environmental consequences which have been included in the baseline environmental conditions (Section 3).

4.16 CUMULATIVE IMPACTS

Cape Canaveral AS accommodates various ongoing space programs. The environmental effects associated with these programs have been included in the baseline environmental conditions (Section 3). Forecasts of future launches are shown in Table 10 (USAF, 1995. These projections indicate that the number of launches is anticipated to decrease by approximately 30 percent. Those launch vehicles with the largest potential impact because of their use of solid rocket motors, including the Space Shuttle, Titan, and Trident programs, will also have substantially fewer launches with the exception of the Space Shuttle.

Additional space programs that are reasonably foreseeable include Space Based Infrared System (SBIRS), Brilliant Eyes (BE), and the NAVSTAR Global Positioning System (GPS) IIR replenishment constellation and their associated launch vehicles. Of these three programs, the GPS IIR is the only one whose final configuration is known. For SBIRS and BE, assumptions regarding the final configuration of the program will be made as necessary to assess cumulative impacts. It is also assumed that no new facilities will be required at Cape Canaveral AS to accommodate these programs.

For purposes of this assessment, it is assumed that six of the SBIRS satellites will be launched using the Titan IV Solid Rocket Motor Upgrade (SRMU). The environmental effects of the Titan IV SRMU have been previously assessed (USAF, 1990), and a FONSI signed. It is also assumed that there will be an overlap with the DSCS III program of two satellite launches from Cape Canaveral AS (one per year for the last two years of the DSCS III/IABS program).

The final number of BE satellites is unknown, as is the launch vehicle (LV). The BE program could also potentially be incorporated into the SBIRS program as a low Earth orbit component. For purposes of this assessment, it is assumed that there will be an overlap with the DSCS III program of nine satellite launches from Cape Canaveral AS (three per year for the last three years of the DSCS III/IABS program) and that the Atlas II will be used as the LV. An EA with a signed FONSI evaluated the effects of up to four Atlas IIAS launches per year from Cape Canaveral AS (USAF, 1991b).

Twenty-one GPS IIR satellites will be launched during the same time period as the DSCS III program (three per year) using the Delta II LV. The environmental effects of the Delta II LV and the GPS IIR constellation have been previously assessed (USAF, 1994b).

All of the LVs are part of existing launch programs whose ongoing environmental impacts have been included in the baseline environmental conditions (Section 3) or assessed in EAs with signed FONSIs. The Medium Launch Vehicle (MLV) II and III programs for DSCS III/IABS and GPS IIR are included in the forecasts shown in Table 10. Therefore, additional foreseeable launches would total no

Table 10 Forecast Launches at Cape Canaveral AS/Kennedy Space Center

Vehicle	FY95	FY96	FY97	FY98	FY99	FY00	FY01
Space Shuttle	7	7	7	7	7	7	7
Atlas	11	10	5	3	5	5	4
Delta	4	6	11	5	5	4	4
Titan	4	4	3	2	2	2	2
Lockheed LV	0	1	2	2	2	2	2
Med-Lite	0	0	0	0	4	2	3
Trident I	4	3	3	2	2	0	0
Trident II	3	4	3	2	2	2	2
UK Trident II	2	0	0	1	0	1	0
TOTALS	**35**	**35**	**34**	**24**	**29**	**25**	**24**

more than four per year, using LVs whose impacts have already been assessed and found to be not significant.

The cumulative impacts are quantified where quantitative information was available or reasonable assumptions could be made. Where quantitative information was not available or assumptions could not be reasonably made, the impacts are assessed qualitatively. In any case, rather than a 30 percent reduction (10 per year) in the number of anticipated launches, there would be a 17 percent reduction (6 per year).

4.16.1 Air Quality

The SBIRS, BE, and GPS IIR programs would use existing prelaunch processing facilities with standby generators and boilers that have already been included in the baseline environmental conditions in Section 3. Additional volatile organic compound emissions would occur primarily from the use of solvents, coatings, and adhesives during prelaunch processing of each satellite. These amounts are small and estimated to total no more than 1 ton per year, cumulatively. As such, the cumulative VOC emissions from all four satellite programs would increase the current baseline for Brevard County by less than 0.17 percent.

Launch impacts from Atlas II and Titan IV LVs are already included in the baseline conditions. Since the Atlas II does not use solid rocket motors, the only launch emission constituent of concern would be carbon monoxide, which rapidly oxidizes to carbon dioxide due to the abundant oxygen and high exhaust temperatures (USAF, 1994b). Specific estimates for the prelaunch processing emissions for the Atlas II are only partially available. However, these emissions would occur under existing permits which reflect the results of the FDEP analysis of emission levels that would not adversely affect air quality.

For the Titan IV SRMU LV, the primary launch emission constituents of concern are carbon monoxide, which would oxidize rapidly to carbon dioxide, aluminum oxide(Al_2O_3), and hydrochloric acid (HCl). These emissions were determined to be not significant for up to six launches per year (USAF, 1990). Prelaunch processing emissions associated with up to six launches per year were not expected to be measurable offsite (USAF, 1990.

Therefore, no significant cumulative impacts on regional air quality are anticipated.

As documented in the EA for MLV III, the total chlorine emissions into the stratosphere for all LVs worldwide would produce an estimated annual ozone reduction of 0.0425 per-

cent. To produce an additional one excess cancer per one million persons, an estimated 0.2 percent reduction in ozone would be necessary (USAF, 1994b).

4.16.2 Hazardous Materials

The SBIRS, BE, and GPS IIR programs are assumed to use similar types and quantities of hazardous materials as those used for the DSCS III/IABS program. Under simultaneous operation of all four programs, there will be an increased demand for hazardous materials at Cape Canaveral AS. As with the DSCS III/IABS program, the impacts associated with hazardous materials for the SBIRS, BE, and GPS IIR programs, will be limited to minor air emissions from the use of small quantities of solvents, coatings, and adhesives. No other impacts from the use of hazardous materials in the new programs are expected if hazardous materials are used in accordance with applicable safety, health, and environmental regulations. Hazardous materials usage associated with the LVs would decrease from the current baseline conditions due to an overall reduction in number of launches.

4.16.3 Hazardous Waste

The DSCS III/IABS program will generate a maximum of 4,753 pounds of hazardous waste per year, or approximately 2,376 pounds per mission. The GPS IIR program will generate approximately 1,330 pounds of hazardous waste per year, or approximately 444.3 pounds of hazardous waste per mission (USAF, 1994b). Assuming that hazardous waste generation rates for each mission of the SBIRS will be similar to the DSCS III/IABS program and the BE program will be similar to the GPS IIR program, annual hazardous waste generation for these programs will be 2,376 pounds for SBIRS and 1,330 pounds for BE. The combined amount from all four satellite programs operating at one time would be 8,459 pounds per year. This represents an increase of approximately 2 percent per year over the current total hazardous waste generation of 420,662 pounds per year at Cape Canaveral AS. The Atlas II LV is estimated to generate approximately 4,200 pounds of hazardous waste per mission (USAF, 1994b). Specific estimates for hazardous waste generation for the Titan IV SRMU are not available. Cumulatively, the annual amount of hazardous waste generated at Cape Canaveral AS would decrease because of the overall decline in number of launches.

4.16.4 Solid Waste

The DSCS III/IABS program will generate approximately 29.5 tpy of solid waste, or about 15 tons per mission. The GPS IIR program will generate approximately 20 tpy of solid waste, or about 6.7 tons per mission (USAF, 1994b). Assuming that the SBIRS and BE programs will generate amounts of solid waste per mission similar to the GPS IIR program, approximate annual solid waste generation for these programs will be 6.7 tpy for SBIRS and 20 tpy for BE. The combined solid waste from all four satellite programs will be 76.2 tpy. This represents an increase of less than 2.2 percent per year over the current solid waste generation rate of 3,492 tpy at Cape Canaveral AS.

Annual solid waste generation associated with the Atlas II LV was estimated to be approximately 64.2 tons per year (USAF, 1994b). Specific estimates for the Titan IV program are not available. However, solid waste for both of these programs is included in the current baseline conditions. With the projected decrease in number of launches, solid waste generation would decrease.

4.16.5 Pollution Prevention

The SBIRS, BE, and GPS IIR programs are assumed to use similar types and quantities of hazardous materials as those used for the DSCS program, including the use of limited amounts of EPA-17 industrial toxics. Cumulatively, the four programs are predicted to use less than 15 gallons per year of materials that contain EPA-17 industrial toxics. All new programs will comply with the PPMAP that will be developed by Cape Canaveral AS. Compliance with the PPMAP will minimize pollution and meet the regulatory requirements relative to pollution prevention. The Atlas II and Titan IV LV programs will com-

ply with Air Force pollution prevention programs.

4.16.6 Nonionizing Radiation

The limiting safe distance for antennas on the DSCS III/IABS satellite is 5.5 feet. Each satellite processed under the SBIRS and BE programs is assumed to have antennas similar to those on the GPS IIR satellite. The limiting safe distance for antennas on the Block IIR satellite is 5 feet (USAF, 1994b). Antennas on both the DSCS and the GPS IIR satellites will be enclosed in a radiation shields during testing to prevent exposure of personnel to hazardous levels of RF radiation. If radiation shields or antenna hats are not used during processing of SBIRS and BE satellites, personnel will need to remain at least 5 feet away from the satellites during antenna testing. Since the respective satellites for each program are separate sources of RF radiation that emit during testing at various times and different locations, there is no cumulative (additive) impact from RF radiation for the different sources.

Safe distances for RF radiation from the Atlas II LV antennas are less than one foot (USAF, 1994b). Information on antennas associated with the Titan IV SRMU LV is not available, but the safe distances are assumed to be similar. Each LV is a separate source of radiation that emits at various times and different locations. Therefore, there would be no cumulative effects.

4.16.7 Ionizing Radiation

None of the LVs carry sources of ionizing radiation. Each of the GPS IIR satellites contains two frequency standards with 200 micrograms of rubidium each, a total of 8.4 milligrams. None of the satellites are anticipated to include nuclear reactors or other significant sources of ionizing radiation. Any low-level radiation sources would be distributed among different satellites, limiting the potential for any additive effects. There would be no anticipated health risks.

4.16.8 Water Quality

As with the DSCS III/IABS program, activities associated with the SBIRS, BE, and GPS IIR programs are not expected to affect water quality. The nature of satellite processing requires that the majority of activities take place within structures, where the potential for impacts from spills or leaks is minimal. The Atlas II and Titan IV LVs will not cause any increased adverse effect on water quality because the overall launch rate is projected to decline. Precautions will be taken to prevent and control spills of hazardous materials for all programs in accordance with 45 SW OPlan 19-1.

Each launch of an Atlas II LV uses approximately 280,000 gallons of water which percolates into the surficial aquifer (USAF, 1989b). The Titan IV SRMU generates approximately 400,000 gallons per launch which also percolates into the surficial aquifer (USAF, 1990). Overall, the amount of deluge water will decrease because of the cumulative reduction in the number of launches.

4.16.9 Biological Communities

Satellite and LV processing would occur in existing facilities and biological communities would not be affected. The LVs are existing types with active launch programs at different launch complexes. Therefore, the biological communities near the complexes are already disturbed due to the existing launch programs. Each SLC has its own light management plan to minimize impacts on sea turtle hatchlings. The anticipated lower cumulative launch rate would decrease the frequency of disturbance near these complexes, but not change the area of disturbance.

4.16.10 Cultural Resources

The SBIRS, BE, and GPS IIR programs would use existing facilities at Cape Canaveral AS. No changes to launch complexes which may be listed or eligible for the National Register of Historic Places or which may be National Historic Landmarks are anticipated. Therefore, no impacts to historical resources are expected. Because no disturbance of earth

is anticipated for any of the programs, archaeological resources would not be impacted.

4.16.11 Noise

For satellite prelaunch processing, all necessary and feasible noise control mitigation measures will be implemented at the affected facilities to meet worker noise exposure limits as specified by OSHA. Due to the distances involved, there will be no noise impact at sensitive receptor locations in public residential areas as a result of the normal prelaunch processing operations.

Each launch is a discrete event which is scheduled so that launches do not occur at the same time. Furthermore, the cumulative number of launches is projected to decrease. Therefore, there would be no adverse cumulative noise impact from launches.

4.16.12 Socioeconomics

The GPS program is an existing program at Cape Canaveral AS, and personnel requirements will actually decrease for the GPS IIR satellite constellation. The LV programs that would launch all the satellites are also existing, and additional personnel would not be required. Assuming that the SBIRS and BE programs will each require 50 additional personnel, the work force at Cape Canaveral AS would cumulatively increase by 67, accounting for the decrease of 50 attributable to the Block IIR program and the 17 for the DSCS program. Assuming 2.8 dependents per employee, the estimated 1995 population of Brevard County would increase by 255. The 1995 estimate of population for Brevard County is 452,737, exclusive of these additions.

4.16.13 Utilities

Water use for the GPS IIR program will be 2,500 gpd based on 50 permanent personnel. Assuming that the required personnel for the SBIRS and BE programs will be roughly the same as those for the GPS IIR program, each of these three programs will also use approximately 2,500 gallons of water per day. The DSCS III/IABS permanent personnel will use 850 gpd. Due to a reduction of personnel in the GPS program from 100 to 50, the water demand at Cape Canaveral AS will decrease from the current 640,000 gpd to a baseline of 637,500 gpd at the beginning of the GPS IIR program. The cumulative actions will increase water use at Cape Canaveral AS to 645,850 gpd, or 1.3 percent above the baseline of 637,500 gpd. The Cape Canaveral AS water supply system has been designed to accommodate periodic deluge water demands.

Wastewater generation for the GPS IIR program will be 1,500 gpd based on fifty permanent personnel. Assuming the same number of personnel will be required for the SBIRS and BE programs, the wastewater generated from each will also be approximately 1,500 gpd. Including the DSCS program wastewater of 510 gpd, the simultaneous operation of all four programs will increase wastewater generation at Cape Canaveral AS by 5,010 gpd. Due to the cumulative projected reduction in the number of launches, wastewater generation associated with the Atlas II and Titan IV programs is projected to decrease. Currently, all major treatment facilities at Cape Canaveral AS have adequate capacity to handle the cumulative load.

Electricity usage should not vary substantially from the existing baseline conditions since existing facilities would be used.

4.16.14 Orbital Debris

For purposes of this assessment, it will be assumed that the end of life average weight for the BE and SBIRS satellites is 3,000 pounds. Therefore, a total of 33,00 pounds of orbital mass from these satellites would be added. The 47,481 pounds attributable to the GPS IIR satellites would be placed in MEO, causing no cumulative impact with the DSCS III/IABS satellites. Assuming the placement of all 11 of the BE and SBIRS satellites in GEO and assuming that orbital insertion systems for each of these satellites would remain in near-GEO, a total of 22 objects would be placed in near-GEO. Adding the 12 objects attributable to the DSCS III/IABS program would increase the number of tracked objects in near-GEO by 34, or 7.5 percent.

4.16.15 Safety

With the increased number of potentially hazardous processes, the risk of accidents will increase. All operations at Cape Canaveral AS are subject to the safety regulations and standards referenced in Section 3.15. In addition, safety for each of the programs will be considered in individual missile system prelaunch safety packages. All hazardous processes will be analyzed and safe procedures established in safety plans. The 45th Space Wing Director of Safety will review and approve all safety procedures.

SECTION 5.0

REGULATORY REVIEW AND PERMIT REQUIREMENTS

5.1 AIR QUALITY

The Florida air pollution control program is managed by the FDEP under authority of the Florida Air and Water Pollution Control Act and the Environmental Protection Act. FDEP administers the air pollution program in Brevard County. The Brevard County Office of Natural Resources is under contract to FDEP for ambient air quality monitoring in the county.

The regulations detailed in the CAA and contained in the SIP are embodied in the permitting programs conducted by FDEP. To ensure the protection of the public health, safety, and welfare, FDEP requires permits for construction and operation of any installation considered to be a source of air pollutants. The policy inherent in the permits program is to protect the air quality existing at the time air quality standards were adopted or to upgrade or improve the quality of the air within the state.

Toxic air pollutants are chemicals that are known to or are suspected of causing cancer or other serious health effects, including damage to the respiratory or nervous systems, birth defects, and reproductive effects. Air toxics include metals, other particles, and certain vapors from fuel and other sources. The Clean Air Act Amendments of 1990 authorize EPA to set standards requiring facilities to sharply reduce routine emissions of air toxics.

Currently, the state of Florida regulates air toxics through the development of No Threat Levels (NTL). An NTL is the ground level ambient concentration of a pollutant to which a person may be exposed and not experience any detrimental effects. The levels were developed as part of a strategy to control the release of toxic pollutants to a no threat level and are, as such, health based standards.

The boiler at the DPF is permitted to operate continuously at its rated capacity under FDEP Permit A005-201125. The generator at the DPF is a standby generators operating less than 400 hours per year and is not required to be permitted by FDEP. The fuel and oxidizer scrubbers at the DPF service the hypergolic vent system. The scrubbers at the DPF operate under FDEP Permit AO05-236505.

5.2 HAZARDOUS WASTE

Hazardous waste management at Cape Canaveral AS is regulated under 40 CFR, Parts 260 through 280, and Florida Administrative Code (FAC) 17-730. These regulations are implemented at Cape Canaveral AS through 45 SW OPlan 19-14, Petroleum Products and Hazardous Waste Management Plan. Cape Canaveral AS holds Florida Department of Environmental Regulation hazardous waste management permit number H005-185569, pursuant to Section 403.722, Florida Statutes. This permit allows management of hazardous waste in designated areas of Cape Canaveral AS in accordance with 40 CFR 264 and 265. USAF operations on Cape Canaveral AS are identified by EPA identification number FL2800016121.

5.3 WATER QUALITY

The Federal Water Pollution Control Act (FWPCA) of 1972, as amended by the Clean Water Act (CWA) and the Water Quality Act

(WQA) of 1987, forms the legal framework to support maintenance and restoration of water quality. The FWPCA is commonly referred to as the CWA and establishes the National Pollutant Discharge Elimination System (NPDES) as the regulatory mechanism to achieve water quality goals by regulating pollutant discharge to navigable streams, rivers, and lakes.

The EPA issues NPDES wastewater discharge permits and storm water permits. The Corps of Engineers issues wetlands permits. The FDEP issues permits for wastewater discharges and shares regulation of wetlands with the Saint Johns River Water Management District. The Saint Johns River Water Management District administers the storm water management program at Cape Canaveral AS. Septic tanks are regulated by the Brevard County Department of Health.

FDEP Permit D005-195237 authorizes the discharge of 0.010 mgd of effluent treated to a secondary level from the treatment plant in the satellite assembly area which includes the DPF.

Spills of hazardous materials are covered under 45 SW Operations Plan (OPlan) 19-1, Oil and Hazardous Substances Pollution Contingency Plan, required by 40 CFR 112. Included in OPlan 19-1 are all applicable federal, state, and local contacts in the event of a spill.

5.4 COASTAL ZONE MANAGEMENT

The Coastal Zone Management Act (CZMA) authorizes a state-federal partnership to ensure the protection of coastal resources. While Florida has specifically excluded federal facilities from the state's coastal zone, as required by Sections 305(b)(1) and 304(1) of the CZMA, the act requires that federal activities directly affecting the coastal zone and federal development projects located in or directly affecting the coastal area be consistent “to the maximum extent practicable” with the Florida Coastal Management Program (CMP). Therefore, the Florida CZMA requires consistency review of federal development projects and activities “. . . which significantly affect the coastal waters and the adjacent shorelands of the state” (380.23(3)(a), FS).

Of the Florida statutory authorities included in the CMP, impacts from DSCS III/IABS processing in the areas of historic preservation (chapter 267), living land and freshwater resources (chapter 372), and environmental control (chapter 403) are addressed in this EA.

SECTION 6.0

PERSONS AND AGENCIES CONSULTED

The following individuals were consulted during preparation of this environmental assessment.

6.1 UNITED STATES AIR FORCE

Cape Canaveral AS

Fragala, Capt Al (45 SPOS/DOD)

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Appendix A

Air Force Form 813

Appendix B

Lighting Policy for Cape Canaveral Air Station

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Purpose of and Need for the Action

Section 2

Description of Proposed Action and Alternatives

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Affected Environment

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